ENGINEERING WHERE THE CONCRETE TIE STANDS TODAY

April 10, 1972

RAILWAY AGE

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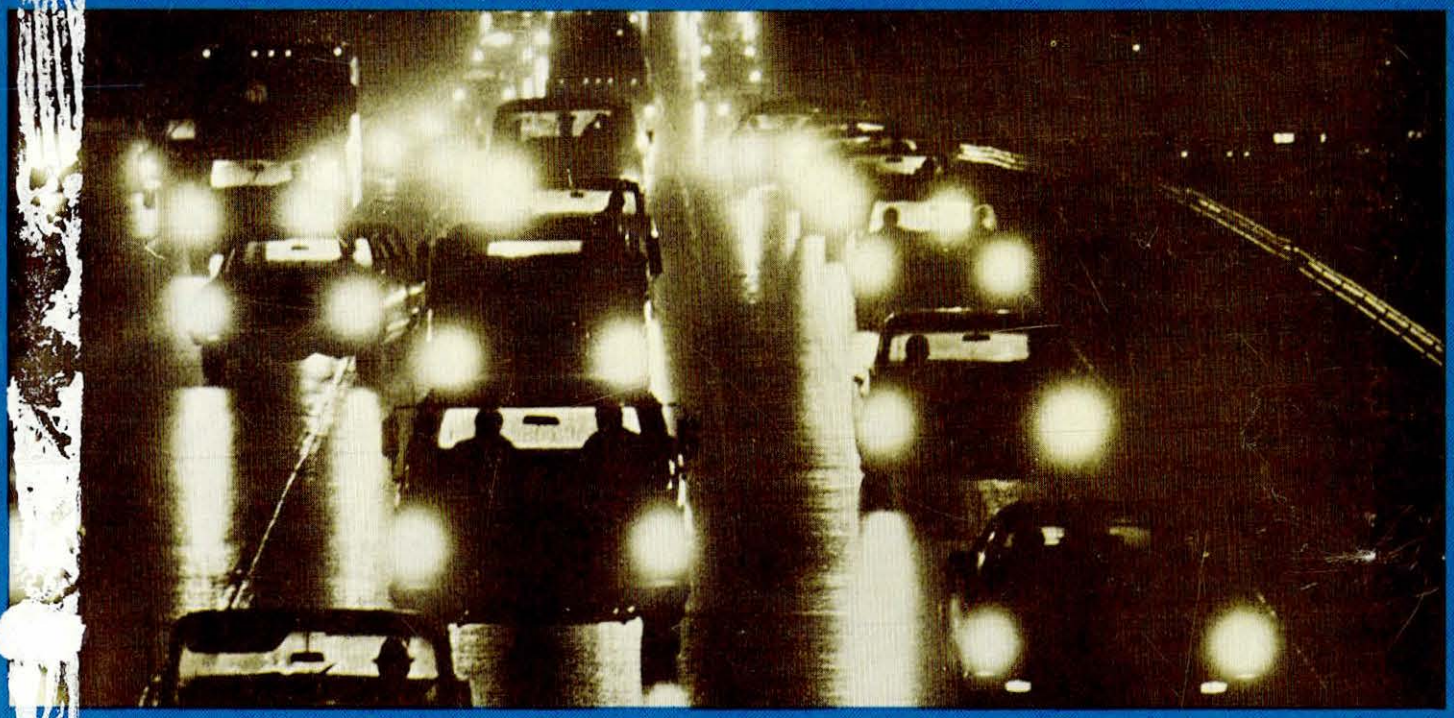

Mass transit vs the highway lobby: A breakthrough?

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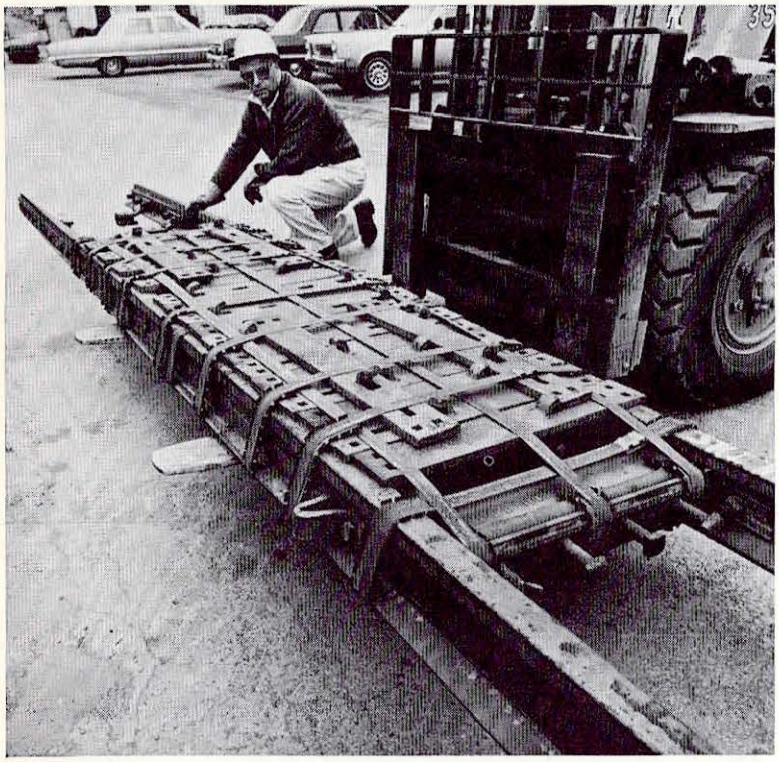

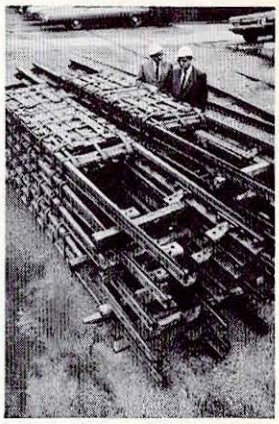

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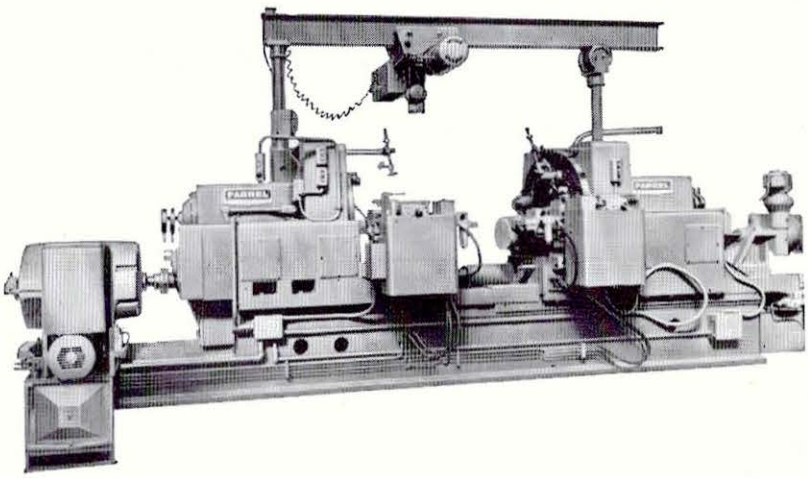

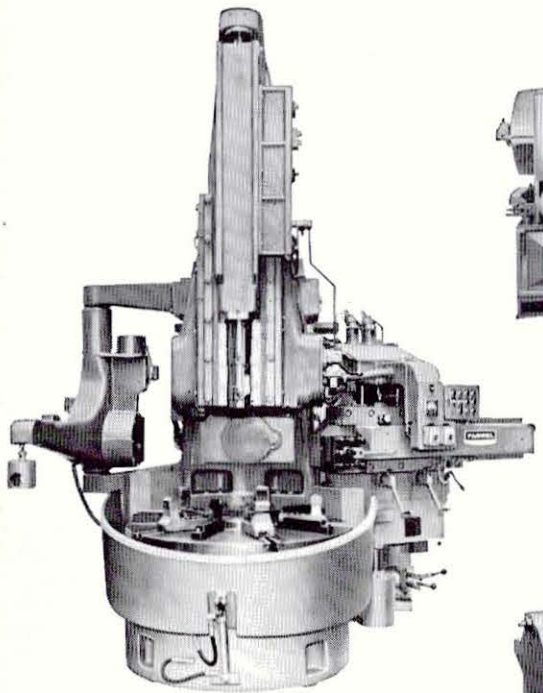

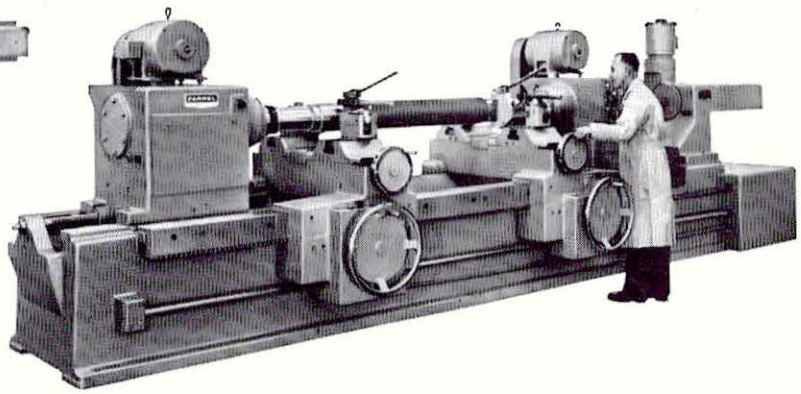

FARREL where railroads shop for machine tools

FR-290

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RAILWAY AGE

April 10, 1972 • Vol. 172 No. 7

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Inside

LUTHER MILLER

HIGHWAY ROBBERY?

For years, the concrete and rubber lobby has stridently advanced and shrilly defended the proposition that the use of highway-derived taxes for any purpose except the pouring of more concrete would be nothing short of highway robbery. Those who think otherwise—who would like, for example, to see automobile money used to alleviate some of the urban-congestion problems that the automobile has helped to create—tend to be prototyped, on the road gang's most-wanted list, as big-city slickers who care naught for the mobility of rural and small-town America.

Warren Hearnes hardly fits the description. A small-towner by birth (Moline, Ill.; pop. 50,000-plus), he has for several years occupied the governor's mansion in an even smaller town (Jefferson City, Mo.; pop. 32,000-plus). He has been a good-roads governor in a rural state where good roads are important. But Hearnes is also the governor of St. Louis and Kansas City, and he has long been aware that there is no concrete solution for the transit pains of those cities.

A few years ago Hearnes went on a flying tour of three cities which, he had been told, had come to grips with these pains rather better than most American cities their size. He went to Toronto and Montreal, and rode their new rail-transit systems. On the way home, he tried out Cleveland's airport rail line. He was impressed. "I saw things that I have never seen before," he told Railway Age at the time (RA, Aug. 4, 1969). And he asked the small group of civic leaders and reporters who had accompanied him: "Isn't it time that we stopped talking and studying and got down to some action."

That action has now come. It has taken the form of a decision to attempt to use gasoline taxes not only to build more highways but to help build rapid transit systems for the state's two biggest cities, and to improve bus systems in smaller towns.

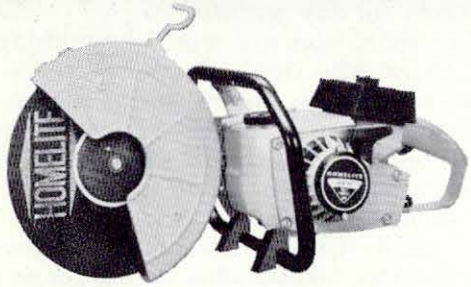
Hearnes gave the highway lobby every chance to compromise; the lobby turned him down (p. 19). Now Missouri's urban leaders—with the support of a rural governor—are trying to go all the way and turn the Highway Trust Fund into a Transportation Trust Fund.

What is happening in Missouri is symptomatic of what is happening all over America. It is not a revolt against highways; the need for them is not questioned. It *is* a revolt against the proposition that highways alone can do the job. What could be a massive breakthrough for mass transit is described by Joe Asher in the cover story beginning on p. 22.

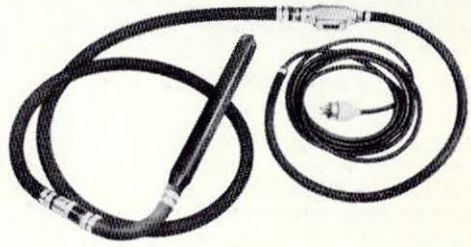
A CONCRETE ANSWER FOR RAILROADS?

It will be small solace to the highway lobby, but the concrete mixers may be finding a new market on the railroads. Engineering Editor Merwin Dick's progress report on the concrete crosstie starts on p. 26.

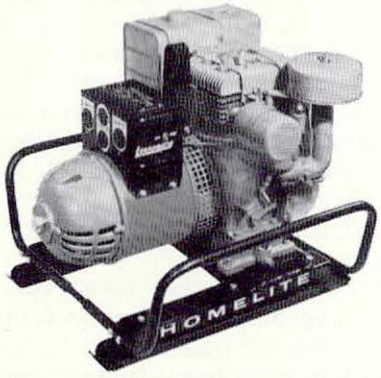
Homelite has more than 80 power units just a few hours away.



Homelite Power Tools We're known for chain saws, but we also make construction saws that cut just about anything. Reinforced concrete, cast and ductile iron, aluminum, steel, pipe, transite and wood. Choose a Homelite grinder, circular saw, chipper-scarifier or multi-purpose saw. All of them are lightweight, powerful and dependable, just like our famous chain saws.



Homelite Concrete Vibrators When you're pouring concrete you've got to get it right first time. Homelite has high-cycle motor-in-head and universal flexible shaft vibrators to speed the job through and get the concrete where it counts, even with low slump mix. Designed from the inside out, and built to move the load, with attachments and extensions to meet your specific job site requirements.



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RAILWAY AGE

April 10, 1972

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COVER

New York City Transit Authority's R-44 test train was clipping along at 80 mph when NYCTA Conductor Stephen Zabel shot this picture at Kew Gardens Station on the LIRR.

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Short and Significant

KUSIK RESIGNS C&O/B&O POSITIONS

John E. Kusik, vice chairman of the C&O board, will not stand for re-election when C&O shareowners vote on a new board at their annual meeting in Cleveland April 20. Kusik, who retired as a C&O senior vice president in 1963, is also resigning as a director and senior vice president of the affiliated B&O.

B&O DEBT-REFUNDING PLAN PROPOSED

A major item of business at C&O's annual meeting will be a vote on a debt-refunding plan for the subsidiary B&O. An unusual feature of the plan is that bonds issued by B&O could be exchanged for common shares of the parent company. The proposed refunding would provide for up to $81 million in B&O bonds to be issued through 1977. If the exchange feature were used, depending on bond and stock market conditions at the time, up to 1,620,000 C&O common shares could be issued. The B&O debt to be refunded includes a $25-million B&O promissory note payable to C&O, which borrowed an equal sum from a bank; $29 million of B&O bank loans; and $27 million of B&O's 11% Collateral Trust Bonds due July 15, 1977.

SHOT IN THE ARM FOR THE NORTHWEST

Southern Pacific has given another boost to the economy of the Seattle area, with placement of orders for 1,700 wide-door box cars with Pacific Car & Foundry. It's the second large SP order won by a Pacific Northwest carbuilder in recent months. Last November, the road contracted for 2,375 cars from Gunderson, Inc. Total cost of the two orders will be upwards of $76 million.

BOARD BEGINS WORK IN SMWIA, PC/UTU CASES

President Nixon has called for reports by April 30 from emergency boards created to study and recommend solutions in disputes involving the nation's railroads and the Sheet Metal Workers' International Association, and Penn Central and the United Transportation Union (RA, Mar. 27, p. 8). Charles H. Rehmus, director of the Institute of Labor and Industrial Relations at the University of Michigan, heads the SMWIA board; chairman of the PC/UTU panel is Francis A. O'Neill, Jr., a former chairman of the National Mediation Board.

$6.3 MILLION TO BN COMMUTERS

A grant of $6.3 million toward the purchase of 25 new double-deck commuter cars plus refurbishing and upgrading of Burlington Northern's existing fleet has been approved by Illinois Gov. Richard Ogilvie. The state grant, along with a contribution of another $6.3 million by the railroad, will make up the required local share needed by the West Suburban Mass Transit District to qualify for a $25.2-million grant from the U.S. Department of Transportation. Aside from the 25 new cars in the $37.8-million program, 94 bi-levels and 21 locomotives in the existing fleet are involved.

NU MANAGEMENT PROGRAM SET

One of the most intensive short-courses in transportation is scheduled to run May 15-June 9 at Northwestern University's Evanston, Ill., campus. Among the speakers and instructors at the Transportation Center's 8th annual Advanced Transportation Management Program will be Yale Brozen, University of Chicago economist; Paul W. Cherington, James J. Hill professor of transportation at Harvard's Graduate School of Business Administration; Charles M. Rehmus, professor of political science at Michigan; and Alan S. Boyd, president of Illinois Central.

BIG BOARD DELISTS WESTERN MARYLAND

The New York Stock Exchange is delisting the common stock of Western Maryland because the number of publicly held shares fails to meet NYSE's recently increased minimum public-holding criterion. The American Stock Exchange has informed WM that its own criteria preclude such a listing—so the railroad has applied for a listing with the National Association of Securities Dealers Automated Quotations System, which now quotes 3,000 stock issues. Meanwhile, WM common is being traded over the counter.

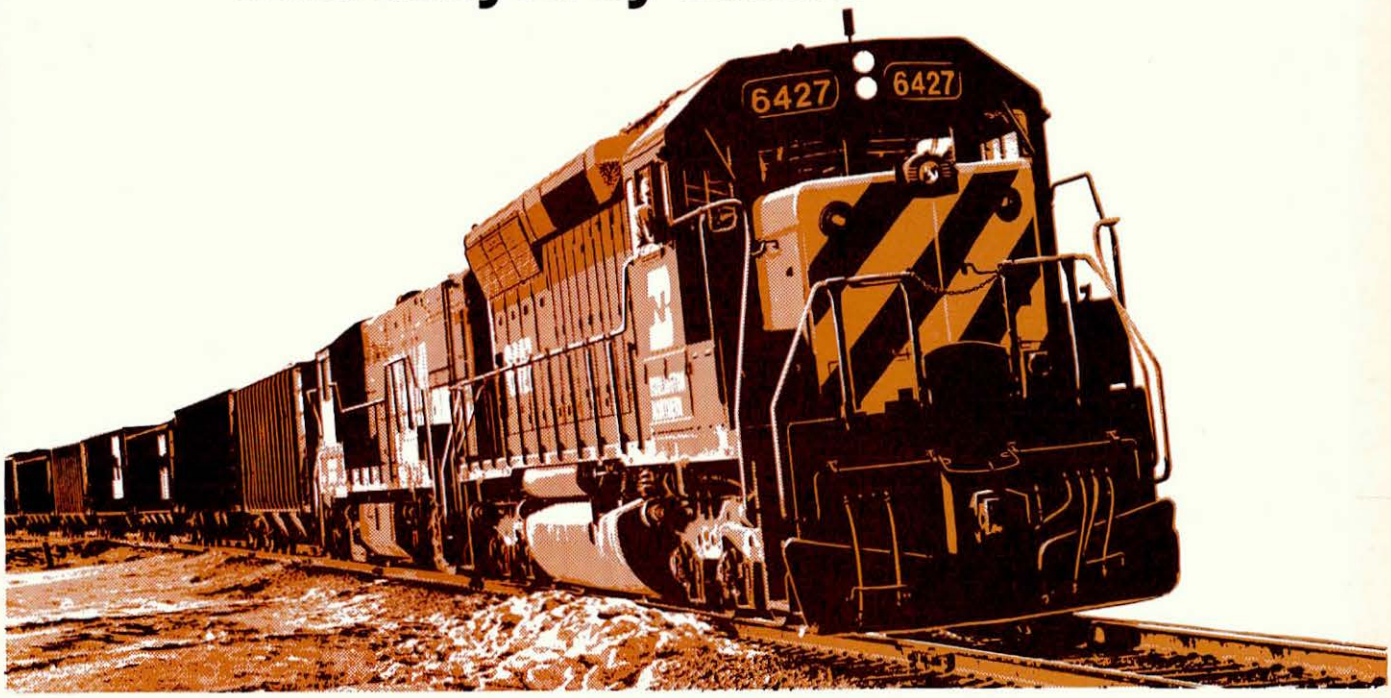
ICC ACTS IN CNJ CRISIS

In an emergency service order dated March 24, the ICC authorized the Lehigh Valley to take over all operations of the Central Railroad of New Jersey in Pennsylvania as of April 1. The order followed an embargo imposed by CNJ preliminary to cessation of operations in the state. The Commission said it acted "to insure continuous service to, from and through Pennsylvania over the lines now being operated by the Central of New Jersey." (RA, March 27, p. 12.)

FOR THE RECORD

Railway Age incorrectly reported March 27 that Canadian National paid no taxes in 1968. CN actually paid taxes of $39.6 million that year.

Another 1,800 miles of microwave ...turnkeyed by Collins



From Chicago to Spokane via St. Paul-Minneapolis, and through 7,000-foot passes in the Rockies. A 93-station microwave network for Burlington Northern.

The system will extend Collins' total microwave installations to more than one million miles.

Scheduled for operation in August, 1974, the network will be a completely solid-state modular system for voice, data, telegraph, and facsimile. The system will be easy to expand and easy to connect with the networks of other railroads.

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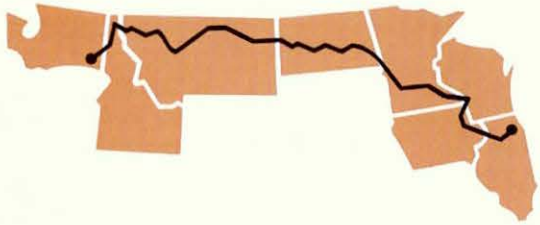
For more information on the turnkey capabilities of Collins, contact Collins Radio Company, Dept. 400, Dallas, Texas 75207. Phone: (214) 235-9511.



Collins microwave: A million miles and growing.

COLLINS

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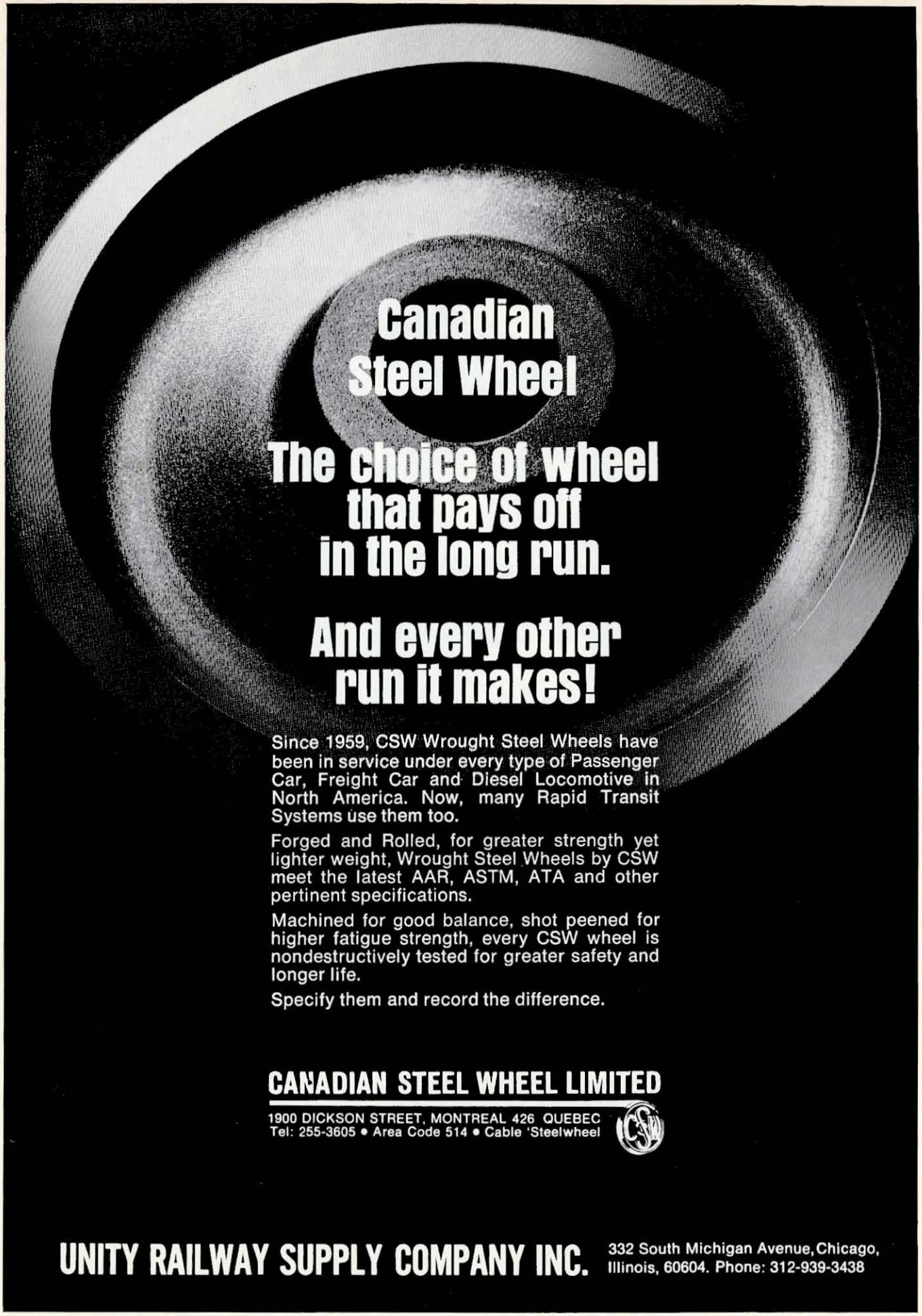
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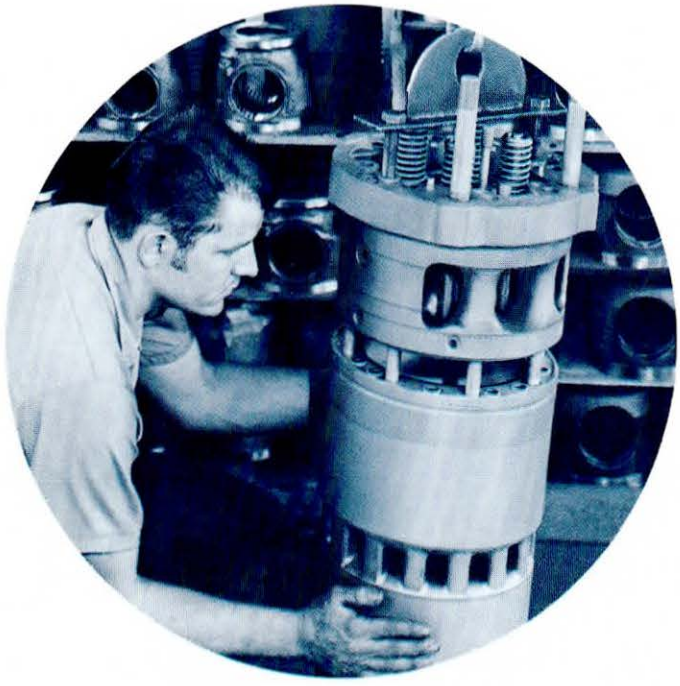

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Circle 11 on coupon page 35

IT ALL STARTED WHEN TREVITHICK GOT THIS IDEA OF A FLANGED WHEEL.

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We started out in the railroad wheel business with the belief that only wrought steel wheels would meet these demands over the long haul. We still believe it.

And that those same demands call for individual craftsmanship—a dependability factor built in by men with pride in their work. Our people—second, third and fourth generation wheel makers—still believe this.

Today's demands require tough wheels, precision built wheels. This means the finest electric furnace steel; bottom-pouring the ingots; forging the wheel blanks to withstand the stress and wear; specially designed mills to roll to size and shape; machining, boring and facing to precise A.A.R. specifications. And then delivering on time. We believe this is the way it should be done and we do it.

All railroad wheels may look the same. They are all round and conform to a specified size and shape. But there is a difference in how they perform—how far they travel without maintenance—how many trouble-free miles they deliver. If there isn't any difference, Edgewater is doing a lot of process quality checking and meticulous inspecting for nothing. We don't think so. For that's what we believe in.

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RAILWAY AGE
NEWS

C&NW rolls toward employee ownership

The one they said couldn't and wouldn't certainly can and probably will.

That's NETCO—North Western Employees Transportation Corp., the vehicle set up to make possible employee-purchase of Chicago & North Western from parent Northwest Industries.

The NETCO plan now has the Interstate Commerce Commission's blessing (RA, March 27, p. 8). It was expected to get a similar seal of approval from the Industries board at an April 5 meeting. With that, and barring unforeseen complications, indications are that the actual transaction could be completed rather quickly, perhaps in a matter of a couple of months.

For the railroad industry, this concept—employee ownership—is all new. The Commission itself called its action unique—"in that it marked the first time an application of this type was ever filed with the ICC."

In approving the NETCO purchase, the Commission:

—Authorized the employee group to acquire all trackage rights, leases, contracts or other joint-use arrangements currently owned by the railroad.

—Authorized acquisition of control of stock ownership of all other carriers which C&NW now possesses.

—Authorized NETCO's purchase of North Western's motor-carrier operating rights.

—Approved control of NETCO for up to 10 years by three trustees, one of whom is C&NW's current president, Larry S. Provo.

In its authorization, the Commission set up 10 "major conditions," ranging from protection of minority shareholders to a restriction on future acquisitions by the carrier. The ICC did not, however, accept an examiner's recommendation that Northwest Industries be required to guarantee the debt of the railway for 10 years after completion of the sale. Instead, the Commission stipulated only that NWI guarantee payment of monies owed as the carrier's share of joint obligations with other railroads—a total of about $6.5 million.

Over the years, C&NW has been a peculiar property. In the 1950s, it seemed to be a railroad with nowhere to go but down. Then new management, headed by Ben W. Heineman (now NWI chairman) took over, and things started to happen. One of the first things C&NW did—and a move which generated nationwide publicity and made a lot of Chicago-area people happy—was to rationalize and re-equip its suburban passenger service and put it on a paying basis. North Western also became one of the first U.S. railroads to turn itself into a conglomerate. And therein lies the tale of why the skeptics said it couldn't and wouldn't, when the NETCO plan was announced in 1970.

Heineman of Northwest Industries

Provo of NETCO

In '69, C&NW has been a big loser, to the tune of about $15 million. Since then, the railway has made a sharp turn-around into profitability—though its net of $4.4 million last year on revenues of about $340 million still represents a marginal showing on a net-to-gross basis. In any event, the accusation was perhaps a natural one: That Industries was trying to stick C&NW people with a used car that had too many miles on the odometer and cereal in the transmission.

In its presentations to the Commission, NETCO tried to refute the charge: "We do not doubt that the railroad can stand alone." By restating income statements of C&NW as they would have been had NETCO been a rail carrier during the 1960s, NETCO could show a relatively bright picture. Moreover, the employee company said, pro forma statements for the 1971-75 period—based on what seemed reasonable revenue/expense assumptions—showed a net of almost $82 million and an "excess of funds provided over funds used [of] $57.7 million, which either could be added to working capital or utilized to upgrade the plant and purchase additional equipment over that assumed in the projection."

NETCO wisely didn't make any attempt to attach a dollar figure to the improvements in labor/management relations which will likely result from employee ownership. Provo feels, however, that in granting approval of the sale of the property, "the Commission is providing the railroad's personnel with a significant new motivational force for greater productivity and service improvements."

In its authorization, the Commission noted that Heineman testified regarding "an independent analysis of NETCO's financial viability. He determined that the railroad in the hands of NETCO would remain only marginally profitable but would still be more viable than if it were to be retained by Northwest Industries."

If the NETCO plan is on its way to resolution, however, other matters affecting C&NW may not be shaping up so clearly. One, of course, is the Rock Island case—in which C&NW has fought Rock Island/Union Pacific merger and presented its own RI/C&NW proposal, and in which an ICC examiner has now drawn his own map of the West. In which C&NW itself would be joined with UP.

The ACI Scanner

THE CHICAGO, WEST PULLMAN & SOUTHERN RAILROAD COMPANY has announced the implementation of an ACI Systems Corp. data collection system to serve the CWP Irondale yard at 104th Street in Chicago.

The initial installation is a 3-in-1 scanning system with 3 ACIS Scanners multiplexed to one LDP (Label Decoding Processor). Specifically, 1 Scanner records all interchange to and from Irondale Yard. The other two Scanners record internal movements between Wisconsin Steel Company and other industries and Irondale Yard. (It is interesting to note that one of these two particular Scanners performs in a close tolerance situation, monitoring the inside track of 3 tracks with 17 ft. centers. It is the first such Scanner placement of its kind anywhere in the U.S.)

The LDP outputs data to CWP headquarters teletype. *Prime mission of the new ACI data collection system will be to serve the CWP as an inventory tool.* Future plans call for the possibility of tying in the CWP's Railweight weigh-in-motion scales with the new ACIS data collection system.

ACIS has turnkey responsibility for the Irondale Yard installation. We're indeed proud that the CWP has chosen our automatic car identification system.

We would be happy to show you how an ACI Systems Corp. Scanner and/or Scale System can economically solve *your* problems in *terminal control.*

W. H. Thompson
President

ACI Systems Corp.

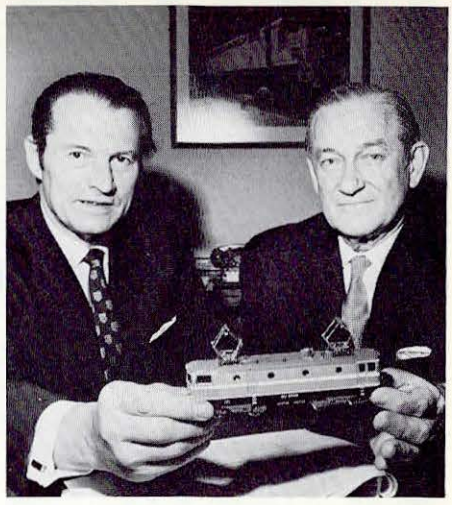
Headquarters: S. Holland, Ill. 60473
520 Armory Dr. Phone (312) 331-6203

Atlanta, Ga. 30303
Phone: (404) 522-5006

Westwood, Mass. 02090
Phone: (617) 329-3382

Circle 20 on coupon page 35

EMD, ASEA enter licensing agreement



Swedish know-how and U.S. know-how will be combined, as General Motors' Electro-Motive Division continues to study development of all-electric locomotives. In a joint announcement, B.B. Brownell (right), vice president of GM and general manager of EMD, and Curt Nicolin, president of ASEA of Sweden, said that GM has obtained a non-exclusive license covering ASEA patents and technical and manufacturing information for its thyristor-type all-electric units.

Brownell called the agreement "an example of EMD's long-standing engineering policy, as a leading diesel-electric locomotive builder, to explore continually various prime movers and systems for motive-power applications, both in the U.S. and overseas. Under our agreement with ASEA, we will have access to advanced and proven a.c. electric locomotive designs." Nicolin recalled that "ASEA was the first company in the world to start series production of thyristor locomotives for main-line duty." Twenty such units were ordered in 1965 by the Swedish State Railways, and 60 additional units have now been delivered on a subsequent order for 100 locomotives. ASEA thyristor designs have also been applied to powering of rapid-transit equipment.

As the photo might indicate—with the framed picture of a diesel-electric in the background—signing of the ASEA agreement does not represent any backing away from EMD's belief that the diesel-electric, raised to its present developmental state, remains the most economical and flexible motive power for U.S. application. As Brownell pointed out, however, EMD has looked long and hard at a variety of types of prime mover, and the arrangement with ASEA represents another instance of this kind of investigative engineering. At the same time, too, a number of major North American roads have been studying electrification, newly or again—though no road, up to this point, has arrived at the go-point.

What EMD will be studying is what ASEA refers to as "the most modern version" of the electric locomotive—that type of unit in which tractive effort is continuously regulated by the electronic influencing of the a.c.-to-d.c. rectifier. ASEA thyristor units in the company's Rc series are rated at 4,900 hp; and at least one North American road, CP Rail, has worked with ASEA in a series of tests, which were carried out last year in Norway with a unit on loan from Swedish State Railways (RA, March 8, 1971, p. 42).

Six conferences are on Transpo agenda

What one onlooker called an "alphabet soup" of meetings will be held concurrently with Transpo '72, the United States International Transportation Exposition, to be held May 27-June 4 at Dulles Airport, Washington, D.C.

The six major conferences are being held under auspices of the International Congress of Transportation Conferences. All will be held in Washington's Sheraton Park Hotel, May 31-June 4.

One of the six, the Intersociety Conference on Transportation, is shaping up as the one of major interest to rail and rapid transit men. Its coordinator is E.J. Sierleja, a senior staff industrial engineer for Penn Central. Its sponsors generally are engineering societies but include the Institute for Rapid Transit.

Focus of the Intersociety Conference on Transportation will be on "public, personal, freight, and other types of transportation services as they relate to planning, technical, and economic factors."

Program arrangements are still in process of completion for the ICT. Rail participants known as of this writing are: Joseph A. Schmidt, director of research services, C&O/B&O; Frank Fisher, vice president of the Reading, and R.W. Radford, Canadian National.

The other five conferences, none with a particular rail bent, are: Air Transportation Conference; International Conference on Transportation and the Environment; International Vehicle and Highway Safety Conference; International Forum for Air Cargo, and the International Experimental Safety Vehicle Conference.

Santa Fe tests in-track welding

Santa Fe is under way with what is described as the first U.S. application of an in-track rail-welding process developed in Europe. Initially, the road is using the process—introduced in the U.S. by Holland's Railweld Division—on about 13 miles of mainline track in Illinois, near Princeville, Ill., and near Fort Madison, Iowa. If it proves out on economic and efficiency bases, Santa Fe says, use may be extended to other points on the system.

With the Holland technique (RA, March 6, p. 32), the welding process is brought to the rail, rather than vice versa. Rails are cropped in-track to eliminate bolt-hole sections, then pulled together and flash-butt electric welded.

Santa Fe now has about 4,000 miles of welded rail in place.

Canada's Turbos will run again

TurboTrain service between Montreal and Toronto, suspended on Feb. 1, 1971, will be resumed early in 1973 following a number of equipment modifications. An announcement by CN on March 29 said that under an agreement reached with United Aircraft of Canada Limited, the trains will be modified to provide three 9-car sets rather than the previous five 7-car sets. In addition, there will be mechanical changes—including an increase in horsepower for engines in the power-dome cars at each end of the trains.

Five TurboTrains were put into service by CN on Dec. 12, 1968; they were removed Jan. 6, 1969, for modifications. Three of the five trainsets were returned to service on May 25, 1970. On Feb. 1, 1971, they were again taken off when, said the CN, "their reliability had declined due to mechanical difficulties."

CN said at the time that passenger response to the Turbos had been "satisfactory" but it was felt better to suspend service "rather than subject passengers to further uncertainties or inconveniences."

In announcing the new modification program, CN President N.J. MacMillan commented: "Canadian National has a continued interest in the development of new passenger train designs, and we look forward together with United Aircraft of Canada Limited to further improvements in the Turbo development program, the first truly advanced passenger train concept."

Lines on Labor

GUS WELTY

THE WORD IS "CHANGE"

It was a railway labor leader talking, and he said this: "With innovation and change, both technological and social, so markedly characteristic of our times, it may well be that labor organizations, if they are to survive as viable, influential institutions, will have to change their public stance and demonstrate a willingness to expect inevitable changes. . .To take the position that we should automatically resist change is as ridiculous as it is unavailing." There was more: The union "must take an intelligent, constructive attitude, recognizing that it is foolhardy as well as ineffective to bury one's head in the sand when inevitable change appears on the horizon. . .We will have a hand in shaping the course of events if we recognize that history is running at full throttle, leaving behind, like disappearing mileposts, those whose only thought was blindly to resist."

AND FOR THE MAN WHO SAID IT, WORD WAS DEED

Those comments were first quoted in Railway Age almost five years ago (RA, May 1, 1967, p. 12). The man quoted was Charles J. Coughlin, then first assistant grand chief engineer of the Brotherhood of Locomotive Engineers and now BLE's president. For those who like to go back and compare what a man says with what he later does, let the record show that Coughlin and the BLE followed through. The current agreement with the Engineers (and the later one with the United Transportation Union) recognizes change and attempts to deal with it. The effort may be belated (and it does not matter, now, whose fault this might be). The point is the effort is being made.

NEXT QUESTION: HOW DO YOU MAKE CHANGE WORK?

Another comment also comes to mind, this one made by a network news commentator a few nights ago. He was talking of the tragedy of Ulster, and his point was that "the time to settle grievances is when things are quiet." Negotiators on both sides in the railroad industry could only say "Amen."

The problem is that, for the railroads, the time of "quiet" is too fast running out. When the first agreements were made in the recent round of negotiations, much was made of the "three-year agreement," with its moratorium provision and (for the ops) with its provision for standing committees to take up unsettled issues. That was all well and good. But the signing of the first agreement seems like yesterday—and tomorrow is almost here.

If it were left to top management—on both sides—there is a feeling that meaningful change could take place, quickly and without trauma. But implementation of agreements takes place throughout an organization. In most instances, implementation seems to be occurring smoothly. In some, though, there is still a feeling that somebody—on one side or the other, or on both sides—can't resist the temptation to sharpshoot.

If you listen to what some people are saying, you come to believe that right now, both rail management and the organizations are on trial—with each acting as a kind of jury to decide the good faith of the other. And on the decision of each party may rest the future of change in this industry that has been so long without it.

Oh, change will come. But how much better—if both sides, all sides, work together to make it happen.

Here's how I'd run

The Trainman

I always hear them talking about higher costs...for power. Replacement parts. Paint jobs. Labor...what have you.

I don't know much about that end of it. But I do say why in the name of common sense don't they *do* something about it? Like changing over to those new lighter-weight stainless steel cars.

I read where the Long Island Rail Road switched to nickel stainless steel cars. And figured they'd save $2.7 million on *power* over the life of their cars—because they're lighter.

And my buddy who works for MTA said they had 600 new stainless steel subway cars. And since they expect the cars to last 35 years, they figure they'll save $5.6 million on power. Plus an additional $800 on each car on maintenance and paint.

I tell you if I were running this railroad...

...hm-m-m, maybe I *should* be running this railroad.

this railroad...

The Commuting Secretary

I'd throw away all the dirty old cars. And get pretty new ones. Like those stainless steel cars on the Philadelphia-Lindenwold Line.

I use that train five days a week and let me tell you something, it's terrific.

I live in Lindenwold and work in Philadelphia. Driving in used to be a 45-minute bore. A real headache.

Now the same trip takes only *22 minutes* by train. And I should add it's a real pleasure. Thousands of other commuters apparently feel the same way I do and have started taking the train every day instead of driving in.

Those beautiful stainless steel trains are so clean and comfortable. And besides, they're automated! I wonder when the rest of the country will catch up with Philadelphia.

...If only *I* ran this railroad.

INTERNATIONAL NICKEL

For a copy of our brochure—"Nickel Stainless Steel—The Modern Material for Modern Transit"—write to Section RA-472, The International Nickel Company, Inc., One New York Plaza, New York, N.Y. 10004. In Canada, The International Nickel Company of Canada, Ltd., P.O. Box 44, Toronto-Dominion Centre, Toronto 111, Ont.

Circle 9 on coupon page 35

New delays seen in Rock Island case

If the ICC does propose a general restructuring of western railroads, Southern Pacific President Benjamin F. Biaggini says that the most immediate effect would be to set back final disposition of the Rock Island merger case by at least five years. Biaggini told a New York financial group that SP had previously looked to a decision in a year or two on the pending case which would allow Union Pacific to acquire Rock Island and sell RI lines south and west of Kansas City to SP.

The possibility that a sweeping realignment would be recommended is indicated by a map in recently published Volume 2 of ICC Examiner N. Klitenic's report on the RI case (RA, March 27, p. 14). Klintenic has said that the as-yet-unpublished Volume 3 will explain the map which shows UP given entry to the San Francisco area; Santa Fe joined with Missouri Pacific, Rio Grande and Western Pacific; and SP merged with Kansas City Southern and Katy.

In a wide-ranging presentation before the New York Society of Security Analysts, Biaggini touched upon a number of other areas.

—SP, said Biaggini, "has gotten more than it planned on and paid for" with its TOPS computer network in terms of the availability, sophistication and timeliness of information. This has now reached a state where SP is talking of scheduling individual cars rather than entire trains. TOPS technology is being introduced on Burlington Northern and British Railways; an investigation is now being made of its use on the National Railways of Mexico. SP is still "in the learning process as far as automatic car identification goes," but the $39 million Colton Yard, scheduled for opening next year, will depend entirely on it.

—With new operating union contracts, SP "has gone ahead aggressively" with elimination of intermediate terminals and switching locomotives, cutting 180 positions since mid-February. The process will continue to compensate partially for the 5% wage increases of April 1 and October 1. SP expects to realize $27 million in increased revenue from higher rates. "We will have to improve our traffic volume and efficiency to make up for union contract increases amounting to $60 million," said Biaggini.

—SP is spending $154 million for 4,937 freight cars, 55 cabooses and 225 locomotives this year. It will acquire $8 million worth of new computers, install 287 miles of new rail, and complete the Sparks, Nev., to Ogden, Utah, microwave this year. SP expects that the FCC soon may clear its application for a specialized common carrier voice and data communication system for the West Coast and is ready to spend $26 million on the project.

—Biaggini termed a "point of breakthrough in railroad trucking" the recent relaxing by ICC of restrictions on key-point service by SP's motor carrier subsidiaries. He sees improved net for SP this year; because of higher capital spending its investment tax credit could be as high as $17 million, compared with $9 million in 1971. While first quarter revenue was up 7%, the business upturn has not been "quite as strong" as forecasts prepared at the end of 1971 had indicated.

Pullman furloughs 2,000 at Bessemer

All of the "usually reliable" economic indicators are starting to point toward an economic boom. But for most freight-car builders, the indicators so far this year have been anything but reliable. Says W.C. Horton, manager of works at Pullman-Standard's big car plant at Bessemer, Ala.: "Despite some optimism shown by economic forecasts that 1972 would show a turn-around in a depressed railway car market, inquiries from the nation's railroads in recent months have been rare."

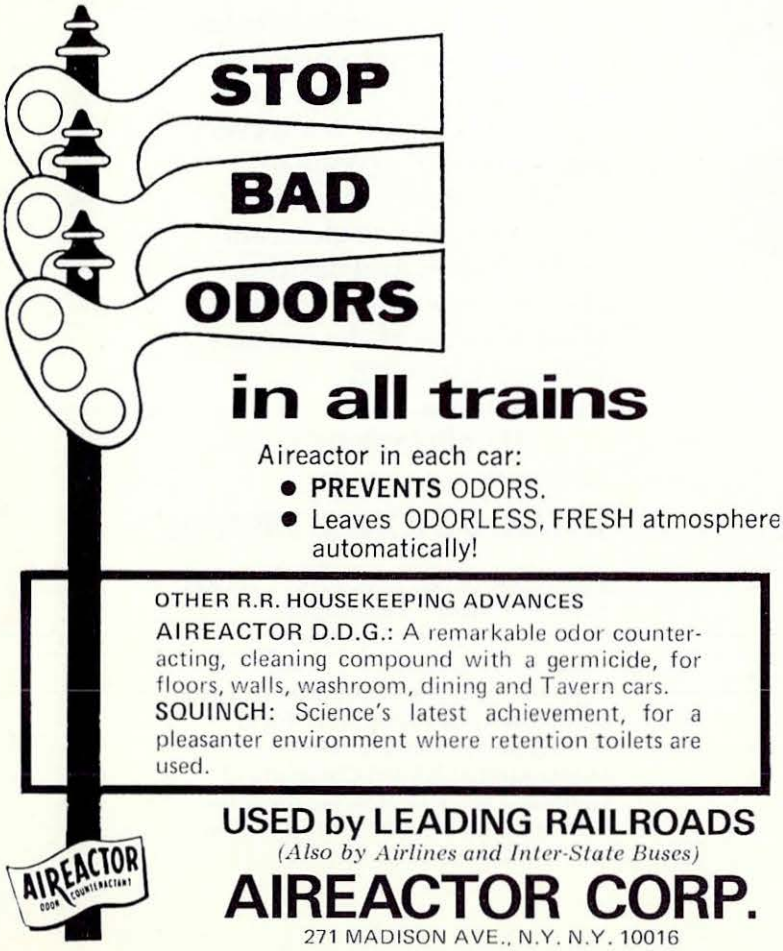
Horton made this observation as he announced the shutdown of the Bessemer plant and the first major layoff of production employees since October 1958.

Work ended on Bessemer's first production track March 24 with completion of an order for 1,050 box cars for Missouri Pacific. Six days later the second track ended work on a 100-car order for Detroit & Mackinac.

Horton said more than 2,000 production employees were affected by the two layoffs.

"Adverse factors that made 1971 a disappointing year for the local plant, during which we delivered only 6,046 cars, are still present, and as yet we have had no clear indication when the economic situation will be reversed and orders will be placed to permit resumption of work."

Among other reasons for the drying up of orders, Horton cited "the lack of Congressional aid that would help depressed railroads obtain equipment loans in an already tight money market."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MOVING PEOPLE

Metro will open car bids May 3

The Washington Metropolitan Area Transit Authority (WMATA) has set May 3 for the opening of bids for its first 300 Metro cars. Five companies are competing for the order—Pullman-Standard of Chicago, General Electric of Erie, Pa., Rohr Corp. of Chula Vista, Calif., Vought Aeronautics Co. of Dallas, Tex., and Toshiba International Corp., of Japan. These firms submitted unpriced technical proposals June 30, 1971, as the first part of WMATA's two-step procurement plan. St. Louis Car Co. also submitted an acceptable technical proposal, but has withdrawn as a possible prime contractor. Sixty cars are to be delivered by June 1974 in time for first-phase Metro operations scheduled to begin July 4, 1974. The remaining cars in the initial 300-unit order will be delivered through 1976.

Missouri may divert highway funds to mass transit

The highway lobby has suffered a staggering defeat in Missouri. Because they rejected a compromise plan to divert a portion of highway funds to other transportation uses (e.g., rapid transit), the highwaymen now face the possibility that all highway money will be dumped into a single fund with no restrictions on its allocation. The compromise which the highway lobby turned down would have permitted diversion of certain user fees to non-highway purposes, but would have restricted the use of gasoline tax revenues to highways. When highway interests mixed this plan, Gov. Warren Hearnes gave his tacit support to a move, now gaining momentum, to go all the way. An initiative drive to place a $730-million transportation bond issue before the voters next November has been kicked off by Missouri's four leading urban strategists—St. Louis Mayor Alfonso Cervantes, St. Louis County Supervisor Lawrence K. Roos, Kansas City Mayor Charles B. Wheeler, Jr., and Presiding Judge George Lehr of Jackson County. The bond issue includes $180 million ear-marked for rapid transit (and another $15 million for bus systems). It would be paid off by a two-cent increase in gasoline taxes. As part of the bond-issue package, the petition calls for a constitutional amendment to permit the creation of a Transportation Trust Fund to replace the present Highway Trust Fund.

Toronto service-tests new subway cars

Following successful acceptance testing, some of Toronto's 76 new Hawker-Siddeley cars have been put into operation for testing under full service conditions. Built at a cost of $11.8 million, the cars were ordered for the Yonge subway extension and to meet rising demand on present lines.

Penn Central's King moves to Amtrak

Amtrak has selected a railroad passenger man to be its new vice president for operations. He is Frank S. (Pat) King, formerly Penn Central's system manager for passenger operations and a 30-year rail man. In his PC job, King oversaw operations of 1,166 commuter trains, plus Amtrak and mail trains. In the Amtrak post, he succeeds Harold Wanaselja, who resigned Feb. 15 to enter consulting work.

New Virginia town will have monorail

A monorail, linked with the Washington, D.C., Metro, is the central feature of a new town called New Franconia to be built in northern Virginia in the next 10 years. The Nilsen Group of New Hope, Pa., promoters of the project, said the model city would have a population of 40,000.

We put our engineering where the wear is!

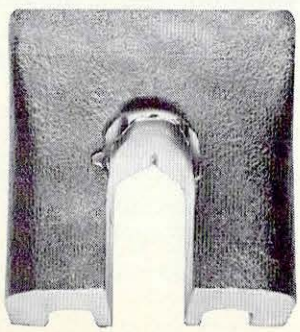
View through center line of New S-606 E Coupler Shank

PROBLEM

With the advent of heavier cars, longer trains, higher speeds, and increased mileage, wear in the keyslot area of a standard type E Coupler Shank has increased.

This has accelerated the elongation of the keyslot and distortion of the shank's butt end.

In many instances this lip of wear cracked and split, leading to possible shank failure.

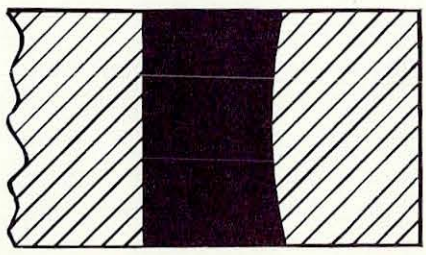


IMPROVEMENTS

ASF® Engineers have made two major improvements in the new S-606 Shank:

We have revised the keyslot rear wall from a straight surface to a curved arc contour to effectively reduce upsetting.

We have redistributed the material behind the rear keyslot wall to substantially increase the butt strength.



ADVANTAGES

After three years of testing, we have gained the following improvements: Stresses in the butt area are greatly reduced . . . as much as 300%. Distribution of stress is more even. We have reduced elongation of the keyslot by 50%. Structural yield load is increased by 50%. The use of Wearpact® "E" Steel provides another 50% reduction in the wear of the keyslot area.

All of these improvements over the present E Coupler are available to you *now*, without any increase in cost or weight.

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Who? *Someone you'd like to see get ahead!*
How? By his signing up for a one year study course to update his shop craft skills. Courses available include:

1-Year Skill Improvement Program for CARMEN: safety, car details, inspection, interchange rules;

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Cost is $6.00 per month for twelve months ($72.00 total). Two lessons are sent each month. We send a progress report to the railroad on request. Upon satisfactory completion of the course, a diploma is issued.

Many other training programs are available and can be tailored to meet particular needs. Coupon will bring information.

Pass this along to someone you'd like to help...

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☐ Please enroll me in the _____ course. Here is my check for $6.00. I will pay $6.00 per month until the course has been completed ($72.00 total). I understand I may cancel at any time.

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RAILWAY EDUCATIONAL BUREAU

Highway money for transit? That's what the man said

The road gang reels as Volpe enlists in transit's tap-the-Trust-Fund campaign.

By JOE ASHER

You knew it was coming sometime. You knew it had to happen before long. And then POW! John Volpe sprang it on us. The DOT Secretary is pressing for diversion of Highway Trust Fund moneys for mass transit.

The timing, frankly, was confusing. Transit people weren't prepared for it. They've been busy instead, trying to push through Congress a bill to get operating subsidies. And that's another kettle of fish—or maybe the same kettle, different burner.

The point is—why press diversion of highway money just at this point? Of course it's great. Of course it's what transit men go home and dream of at night, after a day of fighting balance sheets that don't balance, after putting one more coat of polish on the tin cup that gets whipped out at City Hall, the state legislature, Capitol Hill. Highway money? Why, that's the Promised Land!

Well, we'd better all sober up and walk around it a few times before tripping out.

It's well known that Volpe and his staffers, even the ones most favorable to capital-aid programs for transit, have not been so warm for the operating subsidy idea. Volpe had been quoted as saying he feared it would turn into "a bottomless pit."

Was the trust fund idea tossed out with the intention of clouding the issue, fragmenting the troops on the Hill, and thereby outflanking the other move?

Sources close to Volpe say definitely not. Volpe had no such intention, and the timing was more or less coincidental.

The operating subsidy proposal had been making good progress. It passed the Senate last month. A move to delete it was beaten back 53 to 25. What it does (or more exactly what the amendments to the Housing and Urban Development Act of 1972 do) is authorize up to $400 million in operating assistance in each of the next two fiscal years, beginning July 1. In addition, a rider on the capital-aid side of the same bill authorizes Federal contributions on a 90-10 matching basis (just like highways), instead of two thirds-one third, as at present. The bill comes before a House subcommittee this month, and is given a fighting chance there.

But the other idea—diverting highway money? Volpe himself says: "I haven't talked to 400 Congressmen, but I have talked to individual Congressmen. Getting this bill is not going to be easy, but I was encouraged by not getting flat 'Nos.'

"Of course in the political process, nothing ever comes out exactly as it was written, but I've had enough support to indicate that something along these lines will be passed.

"Seventeen years ago, I was one of the architects of the Interstate Highway Program. I did it and I'm proud of it. But what was good then is not necessarily good for today. We can build all the highways we want, and still not come up with an answer for congestion. So we will stay with this program [the trust fund proposal] and fight for it."

Fighting words, indeed. Public works committee members in both Houses of Congress did not seem to be flipping over with joy. Congressmen were guarded in their comments, but the temperature was closer to the Yukon than the Amazon. The proposal is sure to have tough sledding, in the best of circumstances.

So again—why now? Volpe explains, "I had been thinking all along of a single transportation trust fund. Then the Administration proposed special revenue sharing, so I put the idea on the shelf and supported that. But the needs are so great, they can't wait for special revenue sharing to pass—and I think we agree that it is not going to pass tomorrow."

And will diversion of highway money pass tomorrow? Well, maybe, just maybe. Transit people are used to fighting uphill battles. The thing they have to remember is that pro-highway forces are themselves in a state of some disarray.

Powerful? Sure. Well-financed? You bet. But consider how the times have changed since a young lawyer named Ralph Nader took on Goliath.

The automotive industry was dragged kicking and screaming into making cars safer. And finally, sure enough, highway deaths turned down.

For years, the automotive industry and its harem, the oil, rubber, cement industries, the highway contractors and the rest, had been saying (a) mass transit is dead; (b) it's about to die; (c) it might as well die, because it isn't What The Public Wants.

Slowly, painfully, transit people were getting their own case across. The pie still gets sliced with a big slab for highways, a few crumbs for transit. But in percentage terms, the change in favor of transit has been marked.

Printed handouts from highway groups still toe the same old line. But the phone must be out of order; they don't seem to know that some of their own supporters have switched signals, and that the party line is starting to shift.

Item: At the beginning of this year, Henry Ford II announced support for the idea of diverting "some" highway fund moneys for mass transit.

Item: A month ago, J. Kenneth Jamieson, chairman of Standard Oil (New Jersey), the world's largest oil company, took the same position. At any rate, he said he would "no longer oppose" such a diversion.

To be sure, they only want a *little* diversion. The old joke about highway men is that when they call for "balanced" transportation, they mean 50-50; 50% asphalt and 50% concrete.

Certainly both men stopped short of advocating any swift reversal of pre-

VOLPE'S BOLD PROPOSAL

Highway Trust Fund: In billions of dollars

	Fy 1974	Fy 1975	Fy 1976-79
1. Interstate	$3.25	$3.25	$3.0
2. "Single Urban Fund" (Transit or highways)	1.0*	1.85	2.25
3. Rural Federal Aid System	.8	.8	.8
4. Rural Genl, Trsp. Fund	.2	.2	.4
5. Safety and other programs	.4	.4	.4
	$5.65	6.5	6.85

*Additional transit capital aid would be $850 million ($1 billion less $150 million for R&D) to complete the $3.1 billion contract authority under the 1970 Urban Mass Transit Act.

"We will stay with this program and fight for it." DOT Secretary John Volpe

sent-day priorities on allocation of Federal funds. Just the same, it was a staggering policy shift—for them.

Such policy shifts rarely stem from a sudden change of heart. What is far more likely is that isolated signs of disaffection with roads are starting to look like an open, grass-roots revolt against highways.

There was the well-known case some years back of San Franciscans physically revolting to stop the Embarcadero Expressway in mid-air along their downtown waterfront.

Then there was the case of the Berkeley students burying a brand new Ford.

More recent cases of physical revolts against highways came in New Orleans, Washington, D.C., in Seattle, and in Ocean County, N.J. In the latter case, the State Assembly overwhelmingly rejected a 35-mile four-lane spur to the New Jersey Turnpike, and an Assemblyman commented, "We are witnessing the end of the American love affair with the automobile."

Perhaps the more enlightened of the highway men are taking to heart Talleyrand's old maxim: The secret of diplomacy is to discern the inevitable, and then exploit it. In any case, their new line surely gave Volpe the encouragement he needed to dust off the diversion plan and start working seriously for it.

The way the DOT trust fund plan would work is this. The Highway Trust Fund as it's now constituted generates above $5 billion annually, mainly through gasoline taxes. A portion of that money would be set aside and designated the Single Urban Fund.

This fund would not be statutorily *obligated* to spend trust fund moneys exclusively, as now, for roads. The money would go for capital investment in urban transportation projects to include transit. As Volpe explains, "They can spend it for highways, they can spend it for transit. It becomes a local choice."

The distribution process would be as follows: 40% of the Single Urban Fund would be distributed by DOT directly to the Standard Metropolitan Statistical Areas, on a pro-rata basis according to the total national SMSA population. Another 40% would go to the SMSA's by way of the states, which would be in charge of further local distribution.

The remaining 20% would remain at the discretion of DOT. And as Volpe explains, "This is intended for cities with long-range plans that involve very heavy capital expenditures—for rail rapid transit, for example—and need to be able to make big commitments far ahead."

The matching basis for getting the Single Urban Trust Fund money would be $7 Federal funds matching $3 in local and state funds.

The actual money scale of diversion planned follows. In fiscal 1974, $1 billion would be diverted to the new fund (there's another $840 million besides that—the $990 million authorized under existing legislation, minus $150 million for research and development). In fiscal 1975, it would go up to $1.85 billion. Another $2.25 billion would be spread out through fiscal years 1976-79.

It's important to note that the so-called "diversion" doesn't really siphon off money intended otherwise for roads. Built-in delays in building the Interstate Highway system slowed down the spending of road money anyway. So what this simply does is formalize the spin-out of the Interstate Highway Program that was taking place in any case. The funding for roads remains much as it was.

That takes care of the "massive raid" argument highway supporters are sure to raise.

Whether the Single Urban Trust Fund has a chance to win in Congress this year is a good question. Past experience with public works committee members would say—definitely not. But then, recent events show that experience is not always what you can go by.

One way or the other, the Single Urban Trust Fund and the whole concept of diverting highway money is at last out in the open. It's an issue to join battle on, not a blue-sky idea that nobody takes seriously.

(Continued on next page)

Most of all, the highway people are starting to abandon their favorite old shibboleth that since road users generate the taxes that fill Highway Trust Fund coffers, the money should by right be reserved exclusively for roads.

Transit men argued for years that this makes no sense. Nobody argues that liquor taxes should be used only to build distilleries. What is important here is that the old highway argument is not getting the automatic nod of agreement it always used to.

(Incidentally, if highway user money is so sacrosanct, how come the Senate Public Works Committee toyed last year with the idea of tapping liquor excise taxes and siphoning the money into the Highway Trust Fund?)

Meanwhile, the operating subsidy bill has still to make its way through the House. Transit men are arguing that the need for this is desperate, and indeed, transit operating deficits are ballooning (see table).

There are signs that the Administration, for all its coolness, is at least not fighting the subsidy idea. The first draft of a DOT study last fall on the subject was strongly opposed to the idea. The old fear of a bottomless pit.

Transit men got wind of the study and carried their case directly to Volpe's office, Sources close to him say he listened sympathetically as they explained that this was no crying of "wolf"—it was the prospect of actually grinding to a halt if transit systems don't get immediate help on the operating side. The American Transit Assn., for example, believes that at least 30 cities would see public takeovers of failing private systems, if no help is forthcoming.

State and local operating assistance now comes to $400 million annually. The Federal contribution is zero.

Volpe, so it's said, agreed to another look at the problem. And when the DOT study came out last November, it was still cool to operating subsidies, but open condemnation was dropped, and the door at least left open for some policy change.

So Volpe seems to be steering it down the middle. On the one hand, he is saying, "There is not a ghost of a chance of my getting it [operating subsidies] approved by another wing of the government—I don't mean the Congress—unless you have documentary evidence that operating subsidies would do the job of improving public transportation in terms of service and easing congestion."

On the other hand, his staffers have met with transit people to discuss refinements of the operating subsidy bill's language—against the day that it becomes law.

DOT's position seems to be: "If you can get it, you can keep it. We'll live with it, if we have to."

Indeed, there are signs that the bottomless pit argument doesn't cut as much ice with DOT top staffers as it used to, for two reasons.

First, transit improvements are things you can see—holes in the ground, cars on the track, and so on. Or, put negatively, a system that was going to stop running was given a new lease on life. Where housing and welfare have gotten bogged down in endless local cross-fighting, transit may even be a strong political plus in that it's far less controversial, and in money terms, far less of a "pit" than they are.

Second, the operating subsidy would have a built-in incentive formula in that grants would be based on ridership. The more people you carry, the more cash you get—around 7.5 cents per passenger. The subsidy would not be a blindfolded handout. It subsidizes greater, not lesser efficiency. Linking cash to productivity is the precise opposite of a bottomless pit.

It's also worth adding that under special revenue sharing, the Administration had no objection to tapping Federal funds for operating purposes.

Transit lobbyists in Washington have their work cut out for them. It's thought that the House has a more conservative cast on the transit issue that the Senate, and that more than a few members will be frightened by the idea of "handout."

On the other hand, simple demographics are changing what used to be called purely "urban" or purely "rural" constituencies. Transit experts note that support for the operating subsidy bill in the Senate came from such seemingly odd quarters as Sen. Herman Talmadge (D.-Ga.) and Sen. George Aiken (R.-Vt.).

The old ideas of what constitutes a rural state are changing. Lobbyists note, for example, that something like half the House members come from districts where there is one form or another of public aid for local transportation systems.

To be sure, many of these are tiny bus lines in small towns. But as one veteran of the Washington lobbying wars mentions, "A $30,000 deficit in one of these towns can be as much of a crisis as a $100-million deficit in New York City."

So long as that is true, the transit argument that public transportation should be viewed—and supported—just like any other utility, such as water, sewage and the rest, falls on receptive ears.

America, the automotive industry is discovering, is an urban nation. Volpe himself concedes that he expected support for the trust fund diversion idea along the eastern seaboard, but was surprised to find receptivity in as unlikely a place as Wichita.

That really shouldn't be such a sur-

MISSOURI: Gov. Warren Hearnes wants to use gas taxes to build rapid transit.

NEW YORK: MTA's Ronan emphasizes need for operating as well as capital aid.

MASSACHUSETTS: Gov. Francis Sargent slammed the brakes on urban roads.

prise. In the Far West, the Deep South, the Plains States, the same problems of crowding and air pollution turned up as in the eastern seaboard states. It can't even be said any longer that at least they don't have it on the same scale: California certainly has it, and Denver has been ranked among the top 10 cities of the country in air pollution.

So, the industrialized eastern states continue to lead the battle for urban transit, but they're picking up allies elsewhere all the time. Last year, for example, the National Governors Conference reversed itself and came out for a unified trust fund—diversion and all.

Some important new advances in the east are these:

—In Massachusetts, Governor Sargent got legislation to restrict most future highway building within Route 128—the belt road around Boston.

—In Maryland, Governor Mandel sponsored and got a state department of transportation that puts all moneys in one pot, then parcels it out according to its own estimate of its own priorities (Baltimore rapid transit, for one). Highway trust fund money still has to be segregated, of course.

—But that's not all. In Michigan, Governor Milliken battled for a gasoline tax to finance local transit. He lost the first round, but automotive representatives decided to temper their opposition, and another round will come up.

—In Missouri, Governor Hearnes just kicked off a $730-million master transportation proposal based on a bond issue, which will assist St. Louis and Kansas City to plan and built transit systems, among other things. In addition, the plan envisions diverting gasoline taxes for transit purposes.

California is at once the state with the most automobiles, and the state where disaffection with the automobile gets bitterest. California sponsored tough air pollution laws aimed at automobile exhausts long before the Federal government got around to the issue.

Operating income, U.S. transit systems

(Thousands of dollars)

1935		$ 96,010
1940		76,280
1945		148,730
1950		66,370
1955		55,710
1960		30,690
1961		16,730
1962		19,700
1963	(D)	880
1964	(D)	12,390
1965	(D)	10,610
1966	(D)	37,070
1967	(D)	66,568
1968	(D)	161,072
1969	(D)	220,512
1970	(D)	288,212
1971	(D)	411,000

And there is Bay Area Rapid Transit, scheduled to open this summer. State aid came in the form of diversion of bridge tolls and permission to put some BART segments in the median strips of highways.

Following that came a state gasoline tax, with money specifically earmarked for urban transit up and down the state.

To be sure, a rapid transit referendum was defeated in Los Angeles. But Jack Gilstrap, general manager of Southern California Rapid Transit District, says he'll try again. In the meantime, he notes, close to 200 miles of highway have been legislated out of state master plans, in the past two years.

What this adds up to is many more constituencies for the transit cause. Suburban commuters to the big cities—of course. The poor, the eiderly, the handicapped, the disadvantaged cooped up in the center of cities—of course. So it's no surpirse that the National League of Cities and the U.S. Conference of Mayors have spearheaded the transit fight.

The medium-to-upper-income resident of a medium-sized city away from the big metropolitan centers? No, he doesn't have the message yet. Or he's got only a very spotty version of it.

But as the population increases, as the country gets steadily more urbanized, as roads get quadrupled, and octupled, and *still* don't solve the problem, the message will certainly get through.

Leading figures in the automotive industry seem to have seen the handwriting on the wall. At least some of them have. Perhaps they have pondered the lesson of the railroads—an enduring legacy of public resentment a good half century after the period of overweening power came to an end.

If so, they will have discerned the inevitable, and will study how best to constructively, creatively exploit it.

As Dr. William J. Ronan, chairman of New York's Metropolitan Transportation Authority points out, "In addition to transporting people, we know that urban public transportation systems reduce the economic and social costs of congestion and pollution. Clearly, the time has come when the federal government must shoulder a portion of the operating costs of our nation's urban and suburban bus and rail systems." Just about every other transit operator echoes those sentiments. ■

Where were the profs?

As the tide turns towards mass transit, there is one group that nobody needs to thank for it: the academic transportation experts.

The constituencies building up pressure for transit were numerous and growing. But the group that could have lent its voice with the weight of authority to give some strategic help chose mostly to sit on its hands—or even · deliver Bronx cheers from the sidelines.

Why? Motives can only be guessed at. Perhaps gunshyness in the face of the sheer orneriness of urban problems—academics haven't shed much light on housing and welfare, either. Perhaps a preoccupation with drawing out the trend lines the way they were going. Perhaps a reluctance to bite the hands that were feeding them—when foundations had names like Ford attached to them.

Take the famous Rand Corp. study, "The Urban Transportation Problem," prepared by John Meyer, John Kain and Martin Wohl. In 427 pages, the book "demolished" the case for rapid transit, and wrote off its future completely. In the same 427 pages, it also managed exactly one passing reference each for air pollution and highway accidents.

Or take Prof. Jay S. Forrester, the eminent computer pioneer, who teaches so-called Urban Dynamics at MIT. Essentially the same story: No future for rapid transit.

Forrester's computer-trained students boast of an extraordinary feat: From studying data on Roxbury, Mass. in the 1850s, they were able to extrapolate the town's basic demographics right down to the present time. The idea, of course, is that modern tinkering with housing, transportation and the like is full of effects that cancel each other out.

Asked if they could do the same prediction job on Detroit, working from 1850 figures, they scratched their heads and admitted—"Well, it doesn't work *all* the time."

Examples could be multiplied. One point is clear: The professors were too busy reading each other to read the problem.

Does the concrete tie have a future

Those who say "yes" are in a small minority-but there is a surprising amount of activity in the field.

American railroad engineers, when classified according to their attitude toward the concrete tie, can be divided into three schools of thought:

—Characterized by a neutral attitude, the engineers in Group 1 are neither "for" nor "against" the concrete tie. They are merely indifferent to the tie and will doubtless remain so unless they are forced off dead center by circumstances, such, for example, as a shortage of wood ties.

—Actively or passively "against" the concrete tie, the engineers in Group 2 have made up their minds that the tie is not now, and probably will never be, an acceptable substitute for the wood tie.

—All others fall into the third school. Their attitude ranges all the way from a willingness to experiment with the concrete tie to a conviction that the tie, as presently developed, has proved its suitability, physically and economically, for use in main-line track.

Group 3 is a minority—and a small one at that. Quite likely its position has not been helped by experience in this country with the early designs of prestressed concrete ties. Those experiences have, in fact, been such as to solidify the position of the other two groups, particularly Group two.

• **Interest not dormant.** But interest in the concrete tie has refused to become dormant, even though at times that state has appeared to exist. In fact, when the facade of disinterest and apathy is brushed aside, a surprising amount of activity, marked by solid progress, is revealed. Consider these developments:

—On at least two Class I railroads prestressed concrete ties are being installed in mainline tracks as a regular practice.

—Within the past year at least two large railroads have made, or are in the process of making, extensive test installations of prestressed concrete ties.

—The Special Committee on Concrete Ties of the American Railway Engineering Association has come up with a set of proposed specifications for concrete ties, which have been published as information.

—The Federal Railroad Administration of the Department of Transportation has taken an active interest in the subject. Its moves include sponsorship, in conjunction with the Santa Fe, of a test track in Kansas, which will include concrete slabs and beams as well as concrete ties. This test will feature elaborate instrumentation.

Recent comments on the subject of concrete ties by engineers closely identified with developments in the field have had the effect of helping to explain some of the attitudes toward concrete ties and to bring recent developments into focus. One such engineer is George Way, research engineer—engineering research projects, Chesapeake & Ohio/Baltimore & Ohio, and chairman of the Special AREA Committee on Concrete Ties.

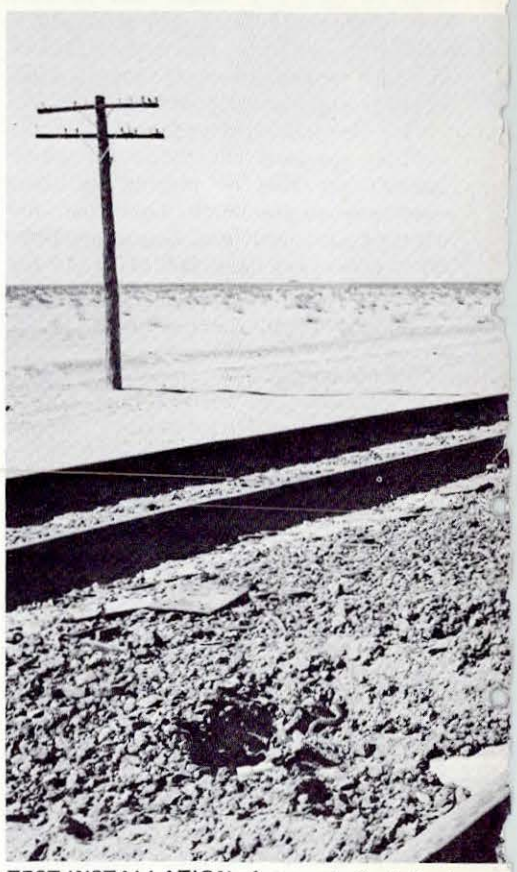
• **No agreement.** Speaking before a regional meeting of the AREA, Way referred to a bibliography of published material on concrete ties which showed that over 100 studies had been prepared since 1918. "And yet," he said, "engineers to this day fail to agree on even some very basic matters relating to concrete tie design, manufacture and, most especially, concrete-tie usage."

In his opinion the differences of opinion surrounding the concrete tie can most likely "be attributed to fear—fear of the unknown and the partially known. Most of us know pretty much what to expect from a treated Grade 5 white oak crosstie. We think we know what it will cost. We have a general idea of how long it will serve under a variety of circumstances. When we see one or a group of track we can be rather sure if it or they are capable of standing up to another year's traffic. If a tie contains splits and checks we can make an assessment of just how serious these are.

"On the other hand, concrete ties present something of a quandary. They come in a variety of shapes and prices with even greater variety in their fastening systems. How long will they last? When are they defective? Some are designed to crack under load. Some are not. So how serious is a crack? What will happen if we have a derailment on concrete-tie track?. . .

"As long as these kinds of questions remain there is ample reason for emotion when the subject of concrete ties is discussed. The way to remove emotion and subjectivity from these discussions is to replace them with rationality, based on objective information."

• **Removing emotion.** Some steps that have been taken toward this end were discussed by Way. One of them relates to the proposed AREA concrete tie specifications. He established the relationship in these words: "Since concrete ties are manufactured they can. . .be made to the whim of anyone who has a hairbrained idea of what concrete ties should be like. They could be made solely to meet price criteria without respect to technical requirements. Because there are so many possible designs, it becomes doubly difficult to predict performance."



TEST INSTALLATION of concrete ties being inser

It was to avoid such difficulties, Way said, that the Special Committee on Concrete Ties was created. The specifications prepared by this committee, he explained, establish performance criteria for concrete ties. They don't specify whether ties should be prestressed. They don't say that ties should be monoblock designs or two-block. However, the specifications do say "very specifically how strong ties must be of a given length when used at a given spacing," said Way.

Experiences with early types of prestressed concrete ties, ties that were made long before the Special Committee on Concrete Ties was established, are discussed in an article in the April issue of *Railway Track and Structures* by John W. Weber, senior transportation engineer of the Portland Cement Association.

• **Early experiences.** These early types,

on U.S. railroads?

Westbound track of Santa Fe's main line near Cadiz, Calif.

says Weber, consist of the AAR Type E and all subsequently modified types up to and including Type III. These ties featured a wedge-shaped bottom at the tie center to reduce the effect of center binding. They also featured the use of four 7/16-inch bright strands as pretensioning elements. Discussing the experience with these early designs, Weber notes that "Several hundred thousand of the early ties were installed in track between 1960 and 1967, many tens of thousands in mainline track. Early during this period problems began to appear. . .In spite of modifications, ties subsequently manufactured and installed in mainline tracks continued to show problems. Some of these problems were serious enough that ties in mainline service for one or more years began to show signs of serious distress."

• **Areas of distress.** Weber then tells how the PCA, because of the problems encountered, undertook an investigation "in an effort to identify the problems, analyze them for cause and to find solutions for them." The result was that four general areas of distress were found in concrete ties in mainline tracks on several railroads. These were:

—Pullout of the inserts into which clip bolts were threaded.

—Flexural cracking in the center portion of the tie.

—Torsional cracking in the center portion of the tie.

—Flexural cracking beneath the rails.

"In addition," says Weber, "several non-structural deficiencies were found, such as spalling of the concrete rail-seat shoulders adjacent to the heel of the rail fastening clips, displaced rail-seat abrasion pads, hair-line radial cracking around the embedded threaded inserts, and broken clips or bolts."

Tackling the structural problems first, PCA found that insufficient embedment of the threaded inserts was the cause of the pullout problem: "Minimum embedment depth for threaded inserts must be 2 3/4 inches; preferably the depth should be greater."

• **Wedge shape not effective.** As for the flexural and torsional cracking at the tie center it was found, says Weber, that the wedge-shaped bottom was not as effective in reducing center binding as hoped: "The wedge bottom so weakened the tie center that not only did a small degree of center binding cause flexural cracking, [but] the torsional forces normally found in track caused, in some instances, outright tie failure.

"The AAR type IV tie design eliminated the wedge bottom, providing much greater cross-sectional area and strength at the tie center. Flat-bottom ties in mainline tracks have not been troubled with either flexural or torsional cracking at the tie center."

Most serious of all, says Weber, was the problem of flexural cracking beneath the rails. In this type of failure the cracks originate in the bottom surface of the tie at a point beneath the base of the rail. They extend directly upward to the top layer of strands and then outward and upward. "Ultimately, the rail seat will break up thus destroying the tie," says Weber.

• **Clues lead to solution.** Engineering detective work turned up two important clues that led to a solution to this problem. The two clues, as described by Weber, are:

—The fact that the ties cracked under service conditions indicated that they were not as strong as they were calculated to be.

—If a prestressed tie cracks due to overloading, the crack should close up when the load is removed. Yet the cracks observed in the early ties did not close up.

From this point on, solution of the problem became one of engineering analysis. An important factor in this analysis was that the prestress force is transferred to the concrete by bond developed at the interface between the strands and the concrete.

"At some distance in from the end of the tie," explains Weber, "the total amount of tensile force in the strand will have been transferred by bond to the concrete. The distance from this point to the end of the tie is the transfer length and any cracking taking place within this length can be said to have occurred in the transfer zone."

• **Shorter transfer length needed.** The key to improved tie performance at the rail seats, as Weber saw it, was to shorten the transfer length of the strands. This could be done only by improving the bond at the strand-concrete interface. Efforts to accomplish this had to take into consideration the fact that bond transfer is a function of (1) surface roughness of the strand; and (2) the surface area of the strand per unit of prestress force.

"Therefore," says Weber, "PCA's approach to a solution consisted of determining the effect on transfer length of roughening the strand surface, and investigating the work of others on transfer lengths of various strand diameters." PCA research showed that the rougher the surface of the strand, all else being equal, the shorter the transfer length. Also, the investigation of transfer lengths for various strand diameters showed that the smaller the strands or

wires the shorter the transfer length.

As an immediate stop-gap measure, says Weber, PCA recommended to the producers and the railroads purchasing concrete ties that the strands be rusted to improve the performance of the ties then being manufactured for placement in mainline track. However, it was recognized that this could never be a permanent solution to the bond-transfer problem because of the practical difficulty of obtaining a uniform rust on the surface of strand packaged in reels.

• **Clue in British ties.** "A better way to go," says Weber, "is to use a larger number of smaller strands or wires, preferably with surface deformations or some other means of achieving surface roughness. The ultimate development of this is to be found in the highly successful British ties which utilize 26 deformed wires for pretensioning elements.

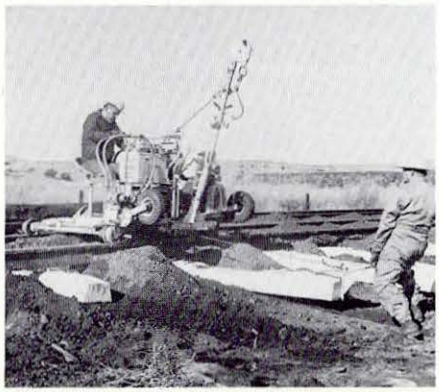
"After much deliberation, PCA recommended the use of six 3/8-inch strands, preferably roughened or deformed, as a means of reducing transfer length to a value assuring full prestress at the points of maximum moment in the tie. This not only allows efficient use of the concrete and steel, it provides superior tie performance in the event flexural cracking beneath the rails occurs due to overload or a poor bearing condition at the tie-ballast interface. The use of a larger number of smaller strands or wires also results in a better distribution of prestress force over the cross-sectional areas of the tie."

Recognizing that there are many ties now in mainline service using 7/16-inch or 1/2-inch strands, which are performing well, Weber says the PCA recommendation "was made to assure maximum strength as well as efficient use of the materials of which the tie is composed."

• **Two types of tests.** Some recent test installations of concrete ties were mentioned by Weber. These, he says, fall into two general categories: (1) Those intended to evaluate and compare ties produced by several manufacturers under severe service conditions; and (2) those that are instrumented in an effort to obtain information pertinent to tie design as well as future track construction. Examples in the first category are recent tie installations on the Santa Fe and on the CNO&TP line of the Southern. Examples of instrumented installations are on the C&O/B&O at Noble, Ill., on the Western Pacific at Thornton, Calif., and will be provided by the DOT/Santa Fe test track in Kansas.

• **Santa Fe service tests.** The Santa Fe test installations include 5,200 ties divided among four widely scattered locations on this far-flung system. Three types of ties are represented in the installations, all of the prestressed mono-block type. One is the Gerwick RT-7 tie manufactured by Ben C. Gerwick, Inc., a division of Santa Fe-Pomeroy, Inc., (no connection with the Santa Fe Railway). Another type is one that is standard on the British Railways.

CONCRETE TIES being placed in position for insertion on Santa Fe by RTW Tie Handler.



FAIRMONT TIE INSERTER pulls concrete tie into final position at Santa Fe test site near Albuquerque.

Ties in this category were manufactured to U.S. specifications by the English firm of Dow-Mac, Ltd., and incorporate modifications specified by Portec, Inc., which has been licensed to manufacture concrete ties in the United States using the Dow-Mac method.

The third type concrete tie installed in the Santa Fe tests is the Model 4 G-H Class A prestressed concrete tie manufactured by Gifford-Hill & Co.

The Santa Fe tests use a variety of fastenings, including the Flexiclip manufactured by The Rails Co., the Cliploc fastener manufactured by True Temper, the CS-5 Spring Lock manufactured by the Tempered Spring Co., Sheffield, England, the Pandrol fastener manufactured by the English firm of Pandrol, Ltd., and made available through the Unit Rail Anchor Co., which is the licensed agent in the United States, and the Portec Improved Fair anchor applied in box-anchor fashion along with gauge blocks for holding the rails to line.

• **One-for-one concrete tie.** All four Santa Fe installations are made on an out-of-face basis with a tie spacing of 29 inches. A fifth installation has been made in which the concrete ties are designed for replacement of wood ties on a one-for-one basis, retaining the wood-tie spacing. The concrete tie used in this installation is known as the Gerwick RT-8 tie. It is smaller in cross section and lighter in weight than the RT-7. The plan called for installation of about 75 of the ties near Richmond, Calif., in replacement of failed wood ties.

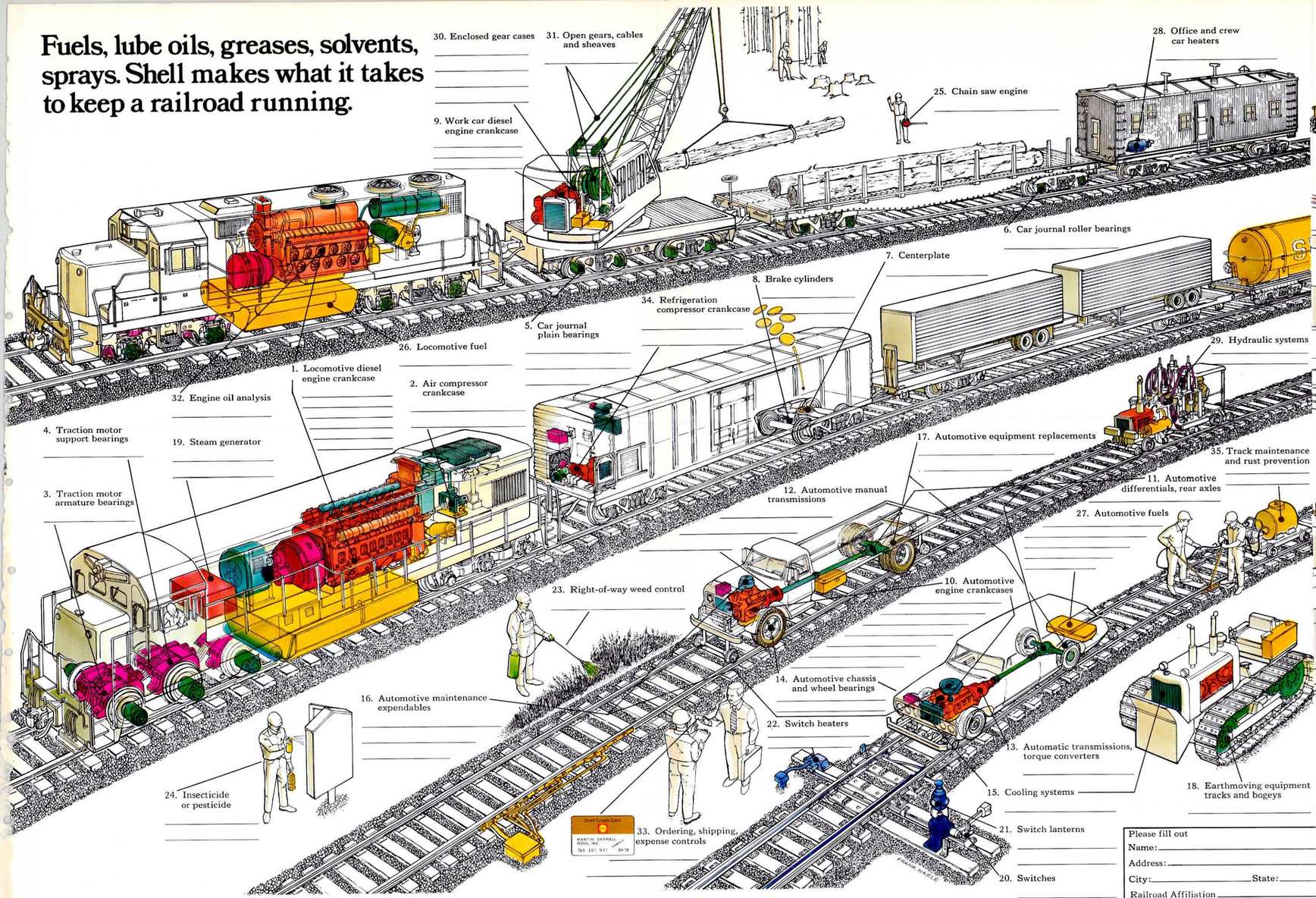
Says W.S. Autrey, chief engineer of the Santa Fe System: "We will be observing the various makes of ties and fastenings to determine if there is particular merit in any type of tie or fastening." He also explained why the Santa Fe decided to make the test installations. "We wanted our own service tests," he said, "so we would be in a position to make a direct assessment of the benefits and/or difficulties that may result from their use. Also, as we look ahead, we visualize the possibility that there may be a change in the economics of wood versus concrete ties. In that case we want to be in a position to make a decision regarding what type or types of concrete fastenings will give the best results."

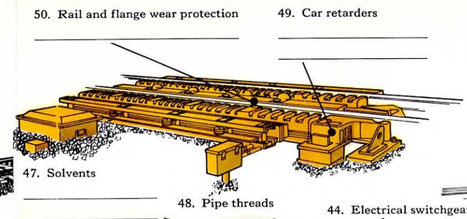
• **Service tests on Southern.** The Southern began installing its test sections on the CNO&TP in November 1971, according to Weber. He adds: "To obtain a realistic evaluation of these ties and related hardware, a test location having heavy annual tonnage and significant track forces was selected in the vicinity of Glen Mary, Tenn. The annual tonnage over the test locations is expected to average 42 million gross tons. The crossties are being installed on curves of 5 to 6 degrees where grades are running 0.75% to 1.10%. It is anticipated that under these track conditions reliable engineering and economic evaluations can be made and serve as a basis for planning future track requirements."

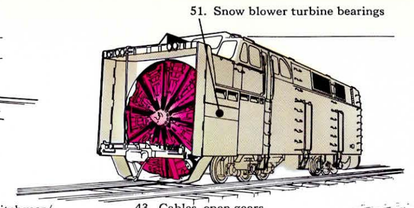
As described by Weber, the Southern test is divided into three parts, each consisting of 1,500 crossties of one design laid on 24-inch centers with 132-pound rail. One of the sections consists of prestressed ties of the modified MR-2 design, using three different types of fasteners—the Cliploc, the Flexiclip and the Unispring made by the Plant City Steel Co. In another section, the test ties are the Gerwick RT-7 design using Cliploc and Flexiclip fastenings. In the third section, yet to be installed, the ties will be of the Dow-Mac type and the fastenings will consist of the Pandrol clip. Polyethylene or rubber pads of several types and

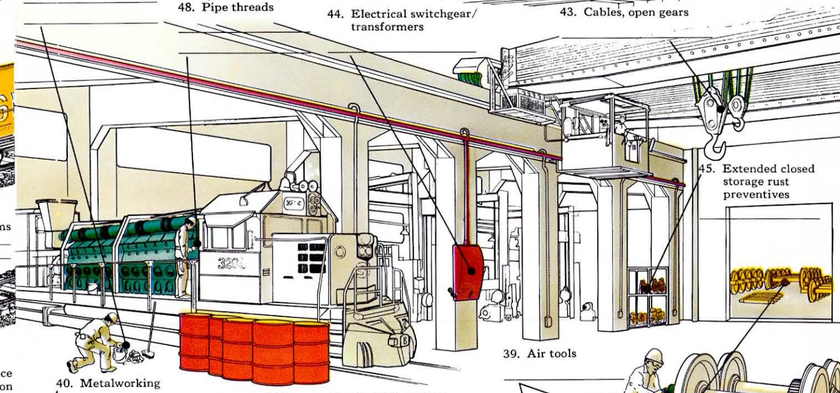
(continued on page 37)

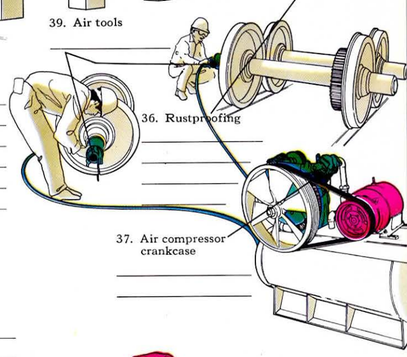
Fuels, lube oils, greases, solvents, sprays. Shell makes what it takes to keep a railroad running.

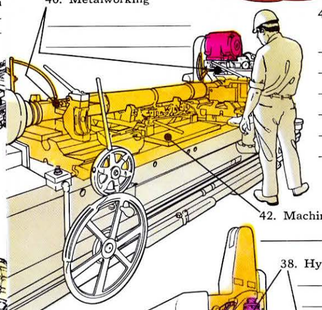

30. Enclosed gear cases
31. Open gears, cables and sheaves
28. Office and crew car heaters
9. Work car diesel engine crankcase
25. Chain saw engine
6. Car journal roller bearings
7. Centerplate
8. Brake cylinders
34. Refrigeration compressor crankcase
5. Car journal plain bearings
26. Locomotive fuel
29. Hydraulic systems
1. Locomotive diesel engine crankcase
32. Engine oil analysis
2. Air compressor crankcase
4. Traction motor support bearings
19. Steam generator
17. Automotive equipment replacements
35. Track maintenance and rust prevention
11. Automotive differentials, rear axles
12. Automotive manual transmissions
3. Traction motor armature bearings
27. Automotive fuels
23. Right-of-way weed control
10. Automotive engine crankcases
14. Automotive chassis and wheel bearings
16. Automotive maintenance expendables
22. Switch heaters
13. Automatic transmissions, torque converters
15. Cooling systems
18. Earthmoving equipment tracks and bogeys
24. Insecticide or pesticide
21. Switch lanterns
33. Ordering, shipping, expense controls
20. Switches

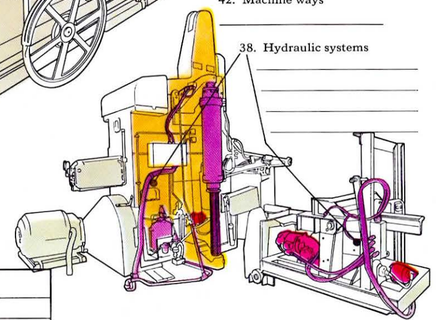


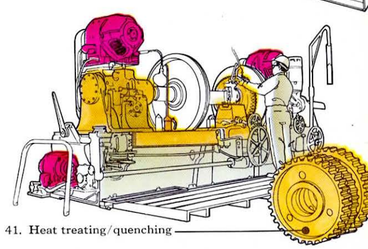












Please fill out

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Railroad Affiliation _____

Title or Position _____

How to enter Shell's "Name the Products" contest

It's easy! No jingles or slogans to write. Nothing to purchase. Just name the Shell products that apply to the picture on the inside fold of this ad. You must use the complete product name of the Shell products. For example: Shell TORNUS® Oil, not just engine oil. First prize: a custom-made caboose with the name of *your* Railroad on it. 15 second prizes: Hamilton Watch desk sets.

Follow these steps: First read the rules below carefully, then remove this ad from the magazine. Just tear it along the perforated line on the left. Then fill in the names of Shell Products right on the ad.

Be sure to fill in your name, address, railroad affiliation and title in the centerfold. Fold your completed entry; slip it into a regular business size 4½" x 9½" envelope. Put two 8-cent stamps on it and mail to Shell Railroad Contest, P. O. Box 61289, Houston, Texas 77061.

ALL CONTEST ENTRIES MUST BE POSTMARKED NO LATER THAN MIDNIGHT JUNE 5, 1972

Rules

1. Eligibility: All full-time employees of railroads operated in the U.S. are eligible to enter the contest.

2. Contest period shall begin on April 1, 1972, or the April issue date of publications carrying the announcement, whichever is earlier. All entries must be postmarked no later than midnight, June 5, 1972.

3. Entry form: The advertisement carrying the contest information may be used as an entry form. Entries may also be made on your letterhead. Only one entry per person. Entries should include full name, address, railroad affiliation and title or position. Mail all entries to: Shell Railroad Contest, P. O. Box 61289, Houston, Texas 77061.

4. Contest rules: The advertisement carrying the contest announcement is in the form of an illustrated guide to Shell Railroad Industry Products and Services. Entrant should fill in blank spaces on the illustrated guide or in blanks keyed to the illustrated guide with as many complete Shell product names (appropriate to each illustration) as correctly applicable.

Note: many applications have two or more applicable products and some products have more than one application, and each will count as a correct answer.

WINNERS WILL BE DETERMINED ON THE BASIS OF THE GREATEST NUMBER OF BLANK SPACES *ACCURATELY* COMPLETED. In the event of a tie, the earliest postmark date will determine the winner.

5. Judging will be by an independent firm of Certified Public Accountants. Their decisions will be based upon a complete product and service list provided to them prior to the contest beginning. This list to remain in a sealed envelope until the entry deadline postmark date. All entrants agree that the judge's decisions are final and that all entries become the property of Shell Oil Company.

6. Judging on the contest will be completed by June 30, 1972. Announcement of winners to be made by means of advertisements in the September issues of the same publications in which the contest is announced. Entrants desiring list of winners may write to Manager Commercial Products, Advertising and Sales Promotion Department, Shell Oil Company, One Shell Plaza, Houston, Texas 77002, after July 15, 1972 to obtain a complete listing.

7. All entrants agree to accept prizes, as offered and, should they win, consent to the use of their name being published in advertising announcing winners immediately after the contest. No cash prize will be awarded.

8. Contest is subject to all applicable laws and regulations and is void where prohibited by law. No purchases are required to enter contest.

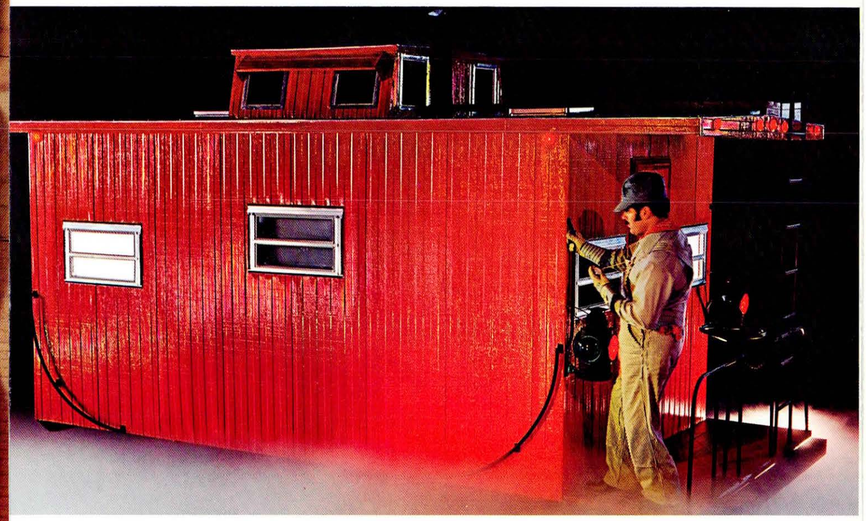
9. Prizes will be delivered F.O.B. winners' home addresses as indicated on entry, arranged for by Shell Oil Company. Entrants agree, if they win, to accept shipment to that point; to accept responsibility for the prize upon delivery; and to accept any tax liability for prizes incurred upon or after delivery.

10. Additional copies of contest illustration and rules may be obtained by writing to: Manager Commercial Products, Advertising and Sales Promotion Department, Shell Oil Company, One Shell Plaza, Houston, Texas 77002.

Copyright © 1972, Shell Oil Company.

Enter Shell's "Name the Products" contest.

Win your very own 1900 Caboose

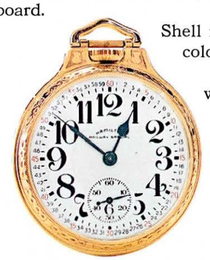


...Or the traditional Hamilton "The Watch of Railroad Accuracy"

Suddenly it's 1900

. . . the steam engine pulls the last of the freight cars through the crossing, and the four-wheeled Bobber caboose* flashes by.

. . . across town, at the depot, the conductor checks his trusty Hamilton as the passengers board.



Shell remembers—and now offers you these pieces of railroading's colorful past as prizes in its "Name the Products" contest.

To the railroad man who's always wanted his own car (and who hasn't?) or envied anyone who owns "The Watch of Railroad Accuracy", here's a chance to win some unique memorabilia. *Look inside and on the back of this folder for contest details.*

*See back cover for the *inside* story about the caboose.

We go out of our way to take care of you.

SHELL

15 Beautiful Hamilton Watch desk sets--- second prizes

A magnificent Hamilton Timepiece and Parker Pen flank a custom-made 12-inch-long, HO gauge model of the Civil War Locomotive, "The General". Authentic down to the last rivet. Hamilton Watch Company made 15 of these "Official Railroad" timepieces exclusively for Shell's "Name the Products" Contest. Better sit right down and send in your entry today! (See rules on inside page)

More than a Caboose--- It's a camper

Tradition on the outside—modern convenience on the inside. There never was a Bobber like this one. 17 feet long. Sleeps four. Beautifully panelled. Fully insulated. Oven, range and refrigerator, Fiberglass® stall shower and commode. Formica® dinette table and counter top.

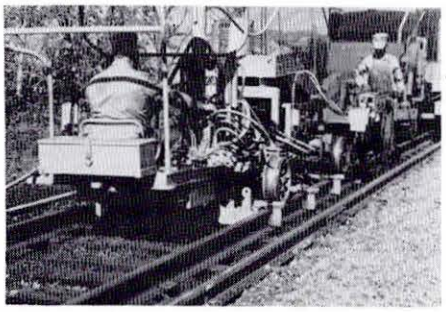
It's ready to go where you go. Complies with highway trailer size and safety regulations. Delivered right to the winner's home address. All aboard!

ALL CONTEST ENTRIES MUST BE POSTMARKED NO LATER THAN MIDNIGHT, JUNE 5, 1972.

We go out of our way to take care of you.

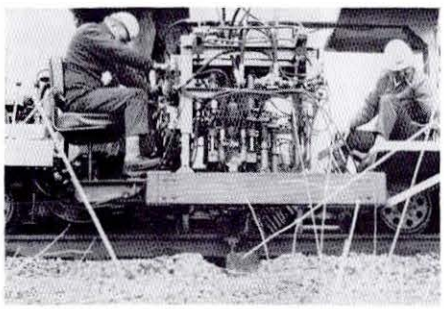
SHELL

New Products Report



Spiker can locate welded rail to precise gauge

A machine has been designed for use with dual laying of continuous welded rail but also can be used with conventional single-rail laying operation, or when transposing rails. Designated the RMC Gauger-Spiker, it uses a hydraulic clamp to bring the rail precisely to the desired track gauge. In a dual rail-laying operation, a trackman at each side spikes every fourth tie, using pantograph-mounted air spike drivers. The gauge can be adjusted as necessary for curves or tangents. In conventional gangs, the manufacturer states that only one man is required to operate the Gauger-Spiker. He drives gauge spikes to secure the rail being laid. All other aspects of the operation remain the same. The RMC Gauger-Spiker is powered by a GM-353 diesel engine driving a 175-cfm compressor for operating the spiking guns. A hydraulic hoist facilitates handling the spikes to the spike tray suspended from the coupler bar. *Railway Maintenance Corp.* (RA-1)



Setter-driver can match tie-gang production rate

The Fairmont W96 Series A Spike Setter-Driver will drive all spikes, except gauge and joint spikes, it is claimed, at the rate of 5½ ties per min, or better than 300 ties per hour. These rates are based on four spikes per tie with two operators plus one man loading the spike chutes. The manufacturer points out that this production obviates the need to shut down the head end of a tie gang early so the spiking operation can catch up before close-up time. Although it is designed for tie-gang use, the W96-A also can be used in rail gangs when laying either jointed or welded rail. Only two men are required when it is being used by a rail gang, it is said. *Fairmont Railway Motors, Inc.* (RA-2)

All-steel crankcase explosion relief valve adds strength

The all-steel 6A Bicera Crankcase Explosion Relief Valve replaces and is interchangeable with the 6 Rd. cast aluminum valve. The new valve has greater strength, a molded Buna N Valve seal, and weighs only 8 pounds. The relief area is 28 square inches. It may be installed as either a bolt-on type or a weld-in type. The 6A's list price is $50. *Penn-Troy Machine Co., Inc.* (RA-3)

Stainless steel coils are available in widths to 52 inches

Stainless steel sheet in coils, exceptionally flat and highly polished, is available to 52-inch widths with gages starting from 0.025 inches. Among applications is the fabrication of rail transit vehicles. The tension-leveled, polished sheet is also available in cut lengths for fabricators without coil-cutting facilities. In the production a series of abrasive belts polish the continously moving sheet, followed by a hot-solvent spray which degreases the sheet. Coils can be protected by paper interleaving, or with polyvinyl plastic. *U.S. Steel.* (RA-4)

Prime mover tractor developed for railroad industry

The Model 25-A Prime Mover tractor can move small numbers of cars, thus freeing switching locomotives. The 25,000-lb unit has a drawbar pull of 20,000 lb on paved surface and four-wheel drive with "no spin" front axle. Also it is equipped with a four-speed

FOR FAST INFORMATION ON 1 to 3 ITEMS ONLY USE THIS
EXPRESS CHECK-OUT CARD
PLACE NUMBER OF ITEM IN CIRCLE
◯ ◯ ◯
AND AIRMAIL DIRECT TO PUBLISHER TODAY

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
TELEPHONE _____ 4/10/72

350 Broadway, N.Y., N.Y. 10013 READERS' SERVICE (Att. J. Meyer)
PLEASE SEND ADDITIONAL INFORMATION ABOUT PRODUCTS IN ADVERTISEMENTS NUMBERED: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59
PLEASE SEND INFORMATION ABOUT PRODUCTS DESCRIBED ON PAGES 35-36 MARKED: RA-1 RA-2 RA-3 RA-4 RA-5 RA-6 NL-1 NL-2 NL-3 NL-4 NL-5 NL-6 NL-7 NL-8 NL-9 NL-10 LIMIT: FIVE NUMBERS
☐ PLEASE SEND INFORMATION ABOUT SPECIAL RAILWAY AGE SUBSCRIPTION PLAN FOR YOUR EMPLOYEES AND CUSTOMERS.
NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____ 4/10/72
Inquiries can be processed only if title and company are shown.

power-shift transmission with torque converter. Four-wheel power steering and four-wheel hydraulic power-boosted brakes are standard. The basic engine is a 127-hp, four-cylinder Detroit diesel. The hydraulic system contains a tandem pump and line arrangement that reduces oil flow velocity and resistance. Options include a 152-hp engine, choice of front and/or rear couplers, and flanged guide wheels for on-track operation. *Galion Iron Works & Manufacturing Co.* (RA-5)

New alloy helical washer exceeds current specifications

Improvements in the National line of helical spring track washers has been announced. The most significant improvement is the utilization of a new alloy chemistry. Resulting from experimentation in conjunction with metallurgical engineers at cooperating steel mills, the new materials are claimed to yield a helical spring track washer with reactive pressures far exceeding any current AREA specifications. In addition to greater pressure, the new alloy-steel chemistry reduces the potential for defects and allows better control over the manufacturing stage due to its greater metallurgical uniformity, it is said. The improvement applies to the Improved Hipower spring washers and Super Hipower spring washers, as well as the 1933 AREA and 1953 AREA Collar Grooved, and Super Collar Grooved spring washers. *National Lock Washer Co.* (RA-6)

NEW LITERATURE

CAR FLOORING. A 14-page, illustrated brochure about Armco's two types of railroad car flooring has been issued by Armco Steel Corp.'s Metal Products Division. The brochure explains the two types—all-steel nailable and composite wood and steel flooring—and shows installation procedures. (NL-1)

BEARINGS. A greatly expanded bulletin on Lastoflex bearings for oscillating motion is available from Lord Manufacturing Co. The 4-page, two-color bulletin includes a list of typical configurations, applications and design opportunities. Supplemental literature, including specific data sheets and performance specifications for parts already in service or under development, is also available. (NL-2)

LIGHTING. A 16-page High Intensity Discharge Lighting catalog for Mercury, Vapor, Lucalox and Metal Halide lamps has been published by Guth Lighting. (NL-3)

AUDIO-VISUAL SYSTEM. Archon, Inc., has issued a data sheet announcing its introduction of the Mobile Multi-Projection System, a compact audio-visual unit that presents rear-projected images from three different types of self-contained projectors. (NL-4)

BULK COMMODITIES. Penn Central has issued a brochure for shippers of bulk commodities. It details a total distribution concept, the Flexi-Flo system, as the answer to dry bulk and liquid distribution. (NL-5)

ROLLER CONVEYOR. A new data sheet from Logan Co. gives complete information about the manufacturer's light-duty, gravity roller conveyor. The conveyor serves many light handling needs in warehouses, distribution centers and loading docks. (NL-6)

CARGO SEALS. A 12-page, 6-language brochure on self-locking cargo seals and sealing systems has been prepared by the Tyden Seal Co. It illustrates and describes the several types of cargo seals in use throughout the world, as well as the complete line of Tyden seals and accessories. (NL-7)

PROBLEM SOLVING. DTA Services, Ltd., has published a descriptive brochure telling what is ahead in transportation costs and services and what is needed to solve specific transportation problems. It describes the complete service DTA freight audit payment plan, a specialized service for Canadian companies shipping and receiving within Canada, to and from the United States, and trading worldwide. (NL-8)

RADAR. An application manual from Hewlett-Packard describes the use of a recently introduced GHz Doppler Radar Module of miniature size and cost. The miniature radar, in a rail system, can determine the facts about traffic at intersections. It detects everything that moves, measuring the velocity and even initiating collision-avoidance action: it measures the speed of a rail car directly with accuracy better than 0.1% (NL-9)

FORGINGS. An 8-page, 4-color brochure published by Lewis Bolt & Nut Co. describes the production and advantages of hot upset forgings for, among others, the transportation and heavy construction industries. (NL-10)

PLACE AIRMAIL STAMP HERE

RAILWAY AGE
350 Broadway
New York, N.Y. 10013

ATTENTION:
R.G. LEWIS, PUBLISHER

AIR MAIL

BUSINESS REPLY MAIL
No postage stamp necessary if mailed in the United States

POSTAGE WILL BE PAID BY

RAILWAY AGE
350 Broadway
New York, N.Y. 10013

ATTENTION:
J. MEYER

FIRST CLASS
PERMIT NO. 153
NEW YORK, N.Y.

Do concrete ties have a future?

(continued from page 28)

designs are included in these tests.

"The economics of maintenance costs, the strength to withstand dynamic track forces, and the ability to maintain a satisfactory track surface and alignment will be considered."

• **Results on WP.** Weber also commented on the instrumented concrete tie installation on the Western Pacific. This consisted of a number of Gerwick RT-7 ties instrumented to develop various values, including static bending moments in the ties at the rail-seat and center-line of the ties, bending moments in the ties at various tie spacings, bending moments in a lone concrete tie placed in a wood-tie section, strand stresses and fastener stresses.

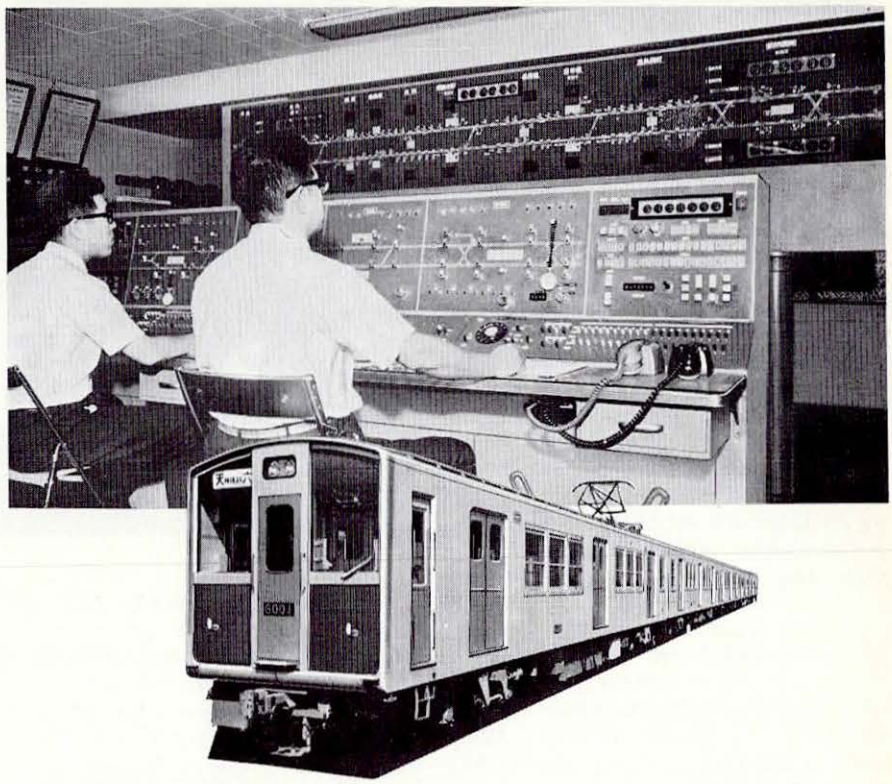
The results showed, among other things, that the maximum recorded bending moment at the rail seats was in "excellent" agreement with the AREA requirements, said Weber. He also said that the maximum recorded negative bending moment at the tie center was such as to indicate that, if center binding occurs in track, it will have to progress to a considerable degree before cracking of the tie takes place.

In the words of George Way of the C&O/B&O, "All the technical studies, laboratory investigations and field tests which have been or will be performed are meaningful only when their results are applied. The lessons learned and experience gained through actual practice are in the last analysis the only proving ground worth mentioning."

• **Many being used.** Weber had something to say about usage. He said that annual concrete tie usage in the United States is averaging somewhere between 100,000 and 200,000 ties in mainline tracks, and that many other thousands are being used in industry tracks. Two railroads, he said, account for most of the ties being used in mainline track. One of these is the Kansas City Southern, which is using large numbers of concrete ties for all new track construction but also has a program for interspersing concrete ties with timber ties in its regular tie-renewal program. All engineering and maintenance-of-way functions are performed for the KCS by Servitron, Inc.

As an example of concrete-tie usage both Weber and Way mentioned the fact that the Black Mesa & Lake Powell, under construction in Arizona, is being built entirely with concrete ties. According to Weber, this 78-mile line, which will move up to 30,000 tons of coal per day, will involve placement of nearly a quarter of a million Gerwick prestressed concrete ties. ■

COMBINED FOR EXCELLENCE



Two companies which have already achieved international recognition in railroading are now combining their engineering talents for new advances in modern urban mass transportation. Kawasaki Heavy Industries, Ltd., a major carbody manufacturer and car assembler, and Tokyo Shibaura Electric Co., Ltd., a major electrical equipment supplier, play an important role on every new car operation on the subway lines in Osaka, Japan's second largest city. Electronic safety devices and fireproof construction ensure maximum passenger safety. These trains are also getting wide attention for their high performance characteristics and ease of maintenance. The paint-free, light-weight durable aluminum exteriors will retain their clean, modern appearance indefinitely.

Toshiba has also developed the world's first Computerized Automatic Traffic Control Equipment. The amazing new computer controls train departures, route settings, destination display, announcements to passengers and records speeds and relates them to advanced schedules. All these help to prevent labor wastes while guaranteeing maximum efficiency and safety.

Toshiba **TOSHIBA**
TOKYO SHIBAURA ELECTRIC CO., LTD.

Producer Goods Export Division:
1-6 Uchisaiwaicho 1-chome, Chiyoda-ku, Tokyo, 100, Japan
Cable: TOSHIBA TOKYO Telex: J22587 TOSHIBA Phone: (03) 501-5411

KAWASAKI
HEAVY INDUSTRIES, LTD.

Rolling Stock Division:
World Trade Center Bldg.,
4-1, Hamamatsu-cho 2-chome, Minato-ku, Tokyo, 105, Japan
Cable: "KAWASAKIHEAVY TOKYO" Telex No. J22672

Circle 14 on coupon page 35

Microfilming EDP output cuts costs for SCL

RECORDS ARE MICROFILMED DIRECTLY FROM COMPUTER TAPE. Computer output is recorded on 16mm microfilm at the rate of as many as 20,000 lines a minute by this Kodak KOM-90 microfilmer.

WAYBILL RETRIEVAL IS AUTOMATIC. Operator keys in the waybill identification code and the waybill appears in seconds on the viewing screen. The associated printer (over operator's head) will produce a facsimile copy of the waybill.

Computer output microfilming is saving Seaboard Coast Line time and money—time for the man who reads reports and time for those who produce them, money in sending the reports to where they are needed and money in producing and storing them on microfilm. Reports prepared by the computer are converted directly to microfilm.

• **Traffic/accounting are in.** Major computer output microfilming applications include consist reports and a daily book (consist record plus a breakdown of car moves listed by car initial and number alphabetically and numerically). Another daily report placed on microfilm is one of freight bills.

Weekly report runs consist of a daily book (combined and filmed weekly); revenue accounts suspense file; and account history, which is accumulated and dumped on a monthly basis and from which a monthly report is prepared that can run to 40,000 images.

SCL is also applying computer output microfilming to numerous Federal Government reports that the law requires be retained indefinitely. "There is another area of our daily operation in which microfilm has greatly increased efficiency and reduced expenses. Waybills are now filmed, automatically coded, and indexed for fast retrieval," reports L.H. Scott, Jr., assistant vice president, systems and information services.

• **Better service for less.** The microfilm recorder works directly off computer magnetic tape, and is able to record data at a higher rate of speed than the conventional impact printer. SCL uses a Kodak KOM-90 microfilmer that records at a rate of 20,000 lines per minute, far faster than an impact printer that operates at 1,100 lines a minute. This speed in microfilming means that records are more promptly and timely produced.

Money savings are represented in many ways, Scott says:

—Printing time-saving.

—Reduced mailing costs. "The cost of distributing a sales report to our hundreds of sales offices throughout the country has been reduced from more than $5 per report to a mere 35c," Scott says. "In addition, each sales office now receives a system-wide report; when paper was the rule, the offices were supplied data covering the activity only in their own areas. The filmed reports are boxed and indexed, ready for immediate reference on their microfilm readers."

—Reduction of storage space. With the cost of storage space at $4.50 a square foot, Scott says the saving in the area of microfilming government reports makes the project worthwhile.

—Reduced paper costs. SCL is turning out a million microfilm images a month, and eliminating an equivalent one million pages of paper.

• **How to do it.** The KOM-90 microfilmer does all this work speedily and simply, Scott explains. "The microfilmer has its own tape-handling unit on which output tapes from our computer are mounted in the usual fashion. With a magazine containing 1,000 feet of unexposed microfilm and a take-up magazine mounted in the microfilmer, the operator simply presses a button to activate the filming cycle. From that point on, filming is wholly automatic.

"As soon as a run of reports is completed, the film is processed in our automatic Kodak Versamat film processor. Film is delivered dry and ready for use."

Waybills are individually filmed, coded and mounted in compact film magazines. Any wanted waybill can be referenced in seconds by simply keying in the proper coding on a Miracode automated retrieval keyboard. If a paper copy of any document image is desired, it is obtained in less than a minute by simply pressing a button on the Recordak Lodestar reader-printer that is part of the Miracode retrieval keyboard.

Microfilming has saved considerable space for storage of waybills. Federal law dictates retention of waybills for three years. Also, waybills must be kept available to answer questions asked by other railroads, as well as queries from customers about actions taken. Waybill copies were formerly kept in large books that were not always available to everyone who needed them at a given time.

• **Use is widespread.** Over 200 microfilm readers of various configurations are used in SCL offices ranging from its Jacksonville, Fla., headquarters to traffic offices across the U.S. Individual car moves—usually a request for the latest move—are handled by Telex from traffic offices to SCL's computer in Jacksonville. But many patrons want to know why cars may be delayed, or even a detailed history of a particular car's moves on SCL. This, reports one SCL sales manager, makes the microfilm weekly records of moves so helpful.

Better service—and saving money, too—is what microfilmed records are doing for SCL. Says Scott: "As in the case of computer output microfilm, the Miracode system of keeping waybills is saving Seaboard thousands of dollars a year, while permitting us to render much faster and better service to other railroads and to our customers." ■

Market Outlook

CARLOADINGS

Loadings of revenue freight in the week ended March 25 totaled 504,613 cars, according to the Association of American Railroads. This was an increase of 2,246 cars, or 0.4%, compared with the previous week, and a decrease of 11,632 cars, or 2.3%, compared with the corresponding week last year.

REVENUE FREIGHT CARLOADINGS

Commodity	Mar. 25 week	Mar. 18 week
Grain	23,852	26,646
Farm products	9,975	10,259
Metallic ores	19,397	18,454
Coal	94,773	93,776
Crushed stone, gravel & sand	24,850	24,120
Nonmetallic minerals	9,942	9,662
Grain mill products	17,441	18,010
Food and kindred products	24,587	24,431
Primary forest products	25,395	26,052
Lumber & wood products (except furniture)	18,085	18,202
Pulp, paper & allied products	23,994	23,403
Chemicals & allied products	31,734	32,003
Petroleum products	9,122	9,092
Stone, clay & glass products	21,166	21,180
Coke	7,705	7,454
Metals & products	25,265	24,164
Motor vehicles & equipment	26,025	25,439
Waste & scrap materials	15,902	15,676
Forwarder & shipper assn. traffic	6,135	6,092
All other carloads	68,696	67,726
LCL	572	584
Total cars loaded	**504,613**	**502,425**
Cumulative total, 12 weeks	1972	1971
	5,669,860	5,932,588
Estimated revenue ton-miles (billions) 12 weeks	170.6	170.2

PIGGYBACK LOADINGS

U.S. piggyback loadings for the week ended March 18 totaled 25,113 cars (6.2% above the corresponding week last year) and 42,327 trailers or containers (up 9.6% from 1971). Cumulative volume for the first 11 weeks of 1972 is 259,454 cars (up 2.8% from last year) and 435,366 trailers or containers (up 7.6% from 1971). In addition to freight, 2,541 cars carrying 4,024 trailers or containers of mail and express traffic were handled piggyback. Cumulative figures for the first 11 weeks of 1972 are 27,379 cars (down 29.4% from the 1971 total, and 42,810 trailers or containers (down 22.9% from 1971).

IN CANADA

7 days ending	Tons of Revenue Freight	Cumulative Totals
March 14, 1972	3,652,206	36,688,451
March 14, 1971	3,728,627	35,588,013

FREIGHT-TRAIN CARS

● *Colorado & Southern.*—Ordered 100 70-ton bulkhead flat cars from Thrall Car.

● *Santa Fe.*—A $4-million order for 100 new refrigerated hopper cars is being delivered by the Amcar Division of ACF. Each of the cars, designed for bulk shipment of perishables, can be loaded with up to 180,000 lb of produce. Their first major assignment will be to haul potatoes from California's San Joaquin Valley to eastern markets.

● *Freight-car orders and deliveries.*—The following report has been released by the AAR and the ARCI:

DELIVERED

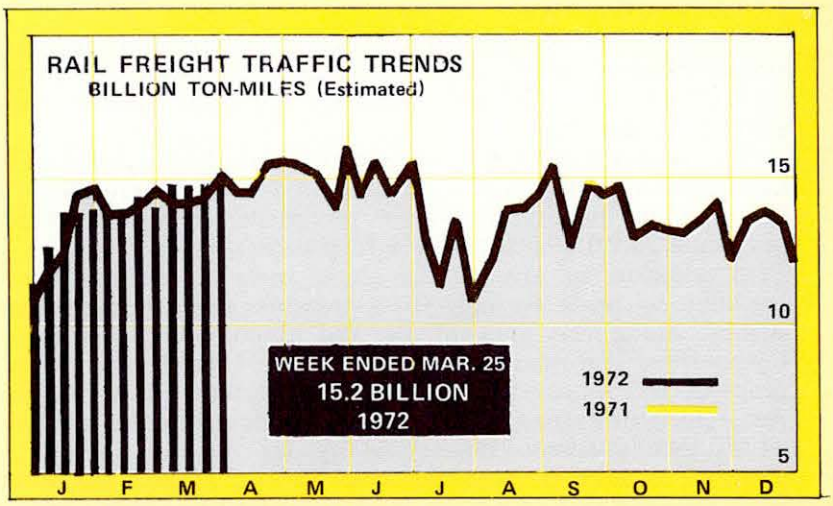
	Feb. 1972	Jan. 1972	Feb. 1971
Built new by car builders	3,327	3,965	4,059
Built new in R.R. shops	240	246	570
Built new—total	3,567	4,211	4,629
Rebuilt	386	328	318
TOTAL DELIVERED	**3,953**	**4,539**	**4,947**

ORDERED

To be built new by car builders	2,025	2,320	2,792
To be built new in R.R. shops	100	1,460	250
To be built new—total	2,125	3,780	3,042
To be rebuilt	500	375	500
TOTAL ORDERED	**2,625**	**4,155**	**3,542**

ON ORDER AND UNDELIVERED

	Mar. 1, 1972	Feb. 1, 1972	Mar. 1, 1971
To be built new by car builders	14,948	17,183	20,425
To be built new in R.R. shops	4,542	4,682	4,590
To be built new—total	19,490	21,865	25,015
To be rebuilt	1,947	1,833	2,193
TOTAL ON ORDER	**21,437**	**23,698**	**27,208**



Source: Association of American Railroads

Watching Washington

REID BEDDOW

VOLPE STEALS THE SCENE

DOT Secretary John A. Volpe's recommendation to Congress on March 14 that $1 billion in Highway Trust Fund monies be diverted to mass transit next fiscal year is more than just election-year log-rolling, but it is surely that, too. "He caught a lot of Democrats swimming with the issue, and ran off with their clothes," said one Republican congressman. The proposal, however, faces real problems. American Trucking Associations President William A. Bresnahan said March 29 that diversion should be accompanied by a reduction in highway-user taxes levied on trucks, an oblique way of saying ATA will fight diversion to the last cent. *Transport Topics*, the official motor carrier newspaper, editorialized that the proposal knocked the "Trust" out of trust fund. More cogently, senior House Public Works Committee members, led by Rep. John C. Kluczynski, chairman of the roads subcommittee, said they opposed the measure. Federal-aid highway and bridge construction contracts awarded last year totaled $4.7 billion, a very large sum of money to a cash-hungry Federal government. It is such vast sums which lead rapid transit booster Rep. Edward I. Koch (D.-N.Y.) to quip the trust fund is a machine for turning money into concrete. Rails will remain studiously silent on the proposal, thereby maintaining their alliance with motor carriers on the proposed Surface Transportation Act.

THE SEARCH FOR A CAR BILL CONTINUES

With Fastcor dead (RA, Mar. 27, p. 14), Senator James Pearson (R.-Kans.) has offered a substitute freight-car proposal for Senate Commerce Committee study. His draft bill would create a rail equipment obligation insurance fund, similar to that proposed by railroads in S. 1731 and by the Administration in S. 2841. However, Senator Pearson's working draft would also impose labor protective conditions on shops building equipment financed by the bill.

The Pearson draft also vests DOT with responsibility for design of a national car information system—a responsibility which railroads would prefer to keep for themselves, albeit with government financing.

Finally, the Pearson draft bears a Republican (if not Administration) stamp, and the Senate Commerce Committee staff would prefer to have a bill carrying the imprimatur of the Democratic majority.

The issues appear to be narrowed to either loan guarantees or an equipment obligation insurance fund with disagreement in the ongoing negotiations over peripheral provisions: labor provisions and the national car information system.

In addition to any of the above measures, railroads will continue to press strongly for a transportation industry loan agency, along the lines of the old Reconstruction Finance Corporation and under the aegis of the U.S. Treasury. This proposal is contained in S. 2362, the Surface Transportation Act, which of course is endorsed by regulated surface carriers. STA's loan guarantee agency is by far the most attractive proposal to rails because the new Federal agency would be empowered to make loans for facilities as well as equipment.

CALENDAR

A special program, **Analysis of Transportation Systems,** will be held at the Massachusetts Institute of Technology, Cambridge, Mass., Aug. 14-25. The program will present the basic concepts and techniques of transportation systems analysis and engineering. Problems of policy, planning, design and operations are to be treated in an integrated manner. The perspective will be multi-modal, with treatment of problems in all modes of transportation, as well as intermodal systems.

The **Annual Distribution Management Conference** of the University of Missouri-Columbia is scheduled for April 25-26. This year's theme will be "Managing the Distribution Function."

Changing Times in Transportation is the subject of a seminar to be held May 5-6 at Syracuse University, Syracuse, N.Y. The seminar, sponsored by the Syracuse chapter of Delta Nu Alpha, will focus on transportation problems and trends.

The 17th **Industry Seminar on Internal Auditing** is to be held April 19-20 at the Sheraton-Chicago Hotel. The subject of the seminar will be "The Unfinished Business of Railroad Auditing."

The first **USA-Japan Computer Conference** is scheduled for Oct. 3-5 in Tokyo. A series of post-conference technical and industrial tours will include a visit to automated control centers of the Japanese National Railways.

Transporama Canada '72, a container and cargo handling exhibition at Toronto's Automotive Building, Exhibition Park, will be held April 18-20. Over 50 exhibitors will show and demonstrate equipment and services.

The 23rd spring meeting of the **Eastern Industrial Traffic League** will be held in Philadelphia's Holiday Inn, Penn Center, April 18-20.

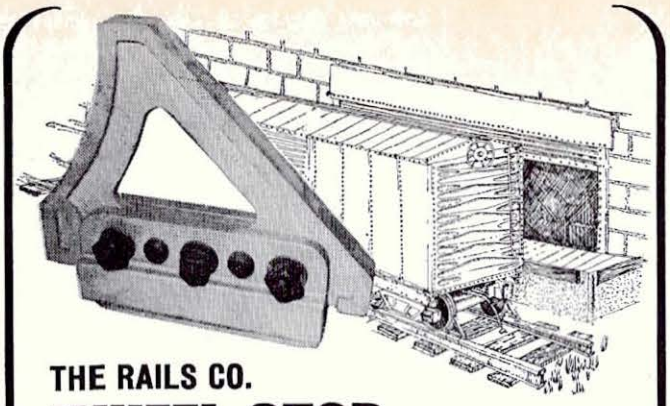
The next regular meeting of the **National Railroad Piggyback Association** will be held in the Marriott Motor Hotel, Newton, Mass., April 13-14.

The annual meeting of the **Institute for Rapid Transit** will be held in the St. Francis Hotel, San Francisco, June 27-30.

The May 16-17 **Transportation Seminar** at St. Anselm College, Manchester, N.H., will concentrate on "framing a realistic national transportation policy." Among the featured speakers at the event will be Secretary of Transportation John A. Volpe and Sen. Robert W. Packwood (R.-Ore.)

The 1972 **National Material Handling Show** will be held April 10-13 at Chicago's McCormick Place. About 250 nationally known companies will display their newest products, techniques and services.

The annual business meeting of the **AAR Mechanical Division** will be held June 22 in the Sheraton Biltmore, Atlanta, Ga.



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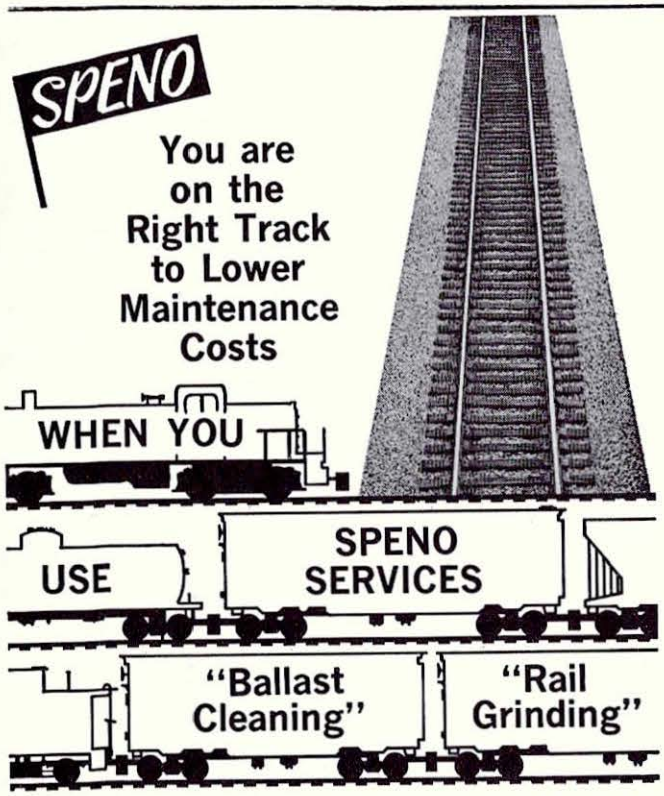

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Circle 17 on coupon page 35

People in the News

CHICAGO & EASTERN ILLINOIS.—C.F Bosch, assistant general manager-rates and divisions, retired Mar. 1.

CHICAGO & WESTERN INDIANA.—Thomas R. O'Reel elected secretary and treasurer and appointed assistant manager of personnel at Chicago. **Hiram E. Crow** appointed assistant secretary and assistant treasurer, and manager of personnel, Chicago.

DELAWARE & HUDSON.—Stanley J. Turner, claim agent, Saratoga-Champlain Division, Albany, N.Y., named chief claim agent there, succeeding **Perry N. Storm,** retired after almost 46 years of service. **Alexander J. Derry,** claim agent, Susquehanna Division, promoted to district claim agent.

FRENCH NATIONAL RAILROADS.—Jacques Meinnier, assistant general manager in charge of publicity, has been assigned to get the new U.S. South-Eastern Region at 2121 Ponce de Leon Blvd., Coral Gables, Fla. 33134, under way. He will be assisted by **Denise Tersiguel** as sales and traffic representative and **Christiane McMullen** as secretary-traffic.

ILLINOIS CENTRAL.—Alan S. Boyd, president, also elected chief executive officer. **William B. Johnson,** who has been chief executive officer, will continue as chairman of the railroad and its executive committee.

JACKSONVILLE TERMINAL.—Frank W. Dyal elected comptroller and secretary-treasurer, Jacksonville, Fla. He formerly was secretary and assistant to comptroller.

MISSOURI PACIFIC-TEXAS & PACIFIC-MISSOURI-ILLINOIS.—Malvin E. Osborne, general agent, Memphis, retired Feb. 29 after 46 years' service.

SUPPLY TRADE

Allen F. O'Rourke has been named Western sales manager, Signal & Communications Division, **WABCO,** Swissvale, Pa., succeeding **Lee G. Phillips,** resigned. Mr. O'Rourke had been regional manager, Uniswitch Division, WABCO, Ltd., Montreal.

Harold Wanaselja has joined **Vollmer Associates** as vice president-public transportation, New York. Mr. Wanaselja was formerly vice president-operations, **National Railroad Passenger Corp.** (AMTRAK), Washington, D.C.

Gene Heyer has been appointed western district manager, **Nife Incorporated.**

Blake Eilbeck, who retired from Nife in October after 20 years in sales engineering with the company, has been appointed engineering consultant.

Russell J. Smith has been appointed general manager of manufacturing and **Steve S. Coleman,** director of marketing, Industrial Castings and Unitcast Divisions, **Midland-Ross Corp.** Mr. Smith has been works manager, Unitcast foundry, Toledo, Ohio, and Mr. Coleman has been general manager, commercial sales for the two divisions. The Industrial Castings Division is headquartered in Cicero, Ill.

Robert A. Kendall, division engineer, **Penn Central,** Toledo, Ohio, has joined **Railway Maintenance Corp.** as district sales manager, southern territory—ranging from Virginia to Florida.

R.L. Bullock has been named senior project engineer, **Standard Car Truck Co.**

L.I. Dillenbeck has been appointed manager data systems, **ACI Systems Corp.**

James W. Cooke, retired vice president, **St. Louis Car Division** (East), **General Steel Industries,** has been appointed to dual transit sales positions with **Gulton Industries, Inc.,** Metuchen, N.J. and with Gulton's **Luminator Division,** Plano, Tex. Mr. Cooke will serve as corporate coordinator of transit sales, with headquarters at Philadelphia. He has also been named vice president of transit sales for Luminator Division.

B.R. Beers, general attorney, **Pullman Incorporated,** has been elected general counsel.

OBITUARY

George K. Weigel, vice president-finance, **IC Industries,** died Mar. 21 at his home in Olympia Fields, Ill.

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Viewpoint

Those track standards: A positive approach

There they were—a former high-level government official who opted for the private-enterprise life; and a man whose whole career had been with the railroad, from switchman to senior officer.

The stage might have been set for an all-out assault on governmental interference with managerial rights. Each man, in his own way, had bumped into the government/railroad interface. The audience seemed made-to-order—the railroad industry's top civil engineers, men who now must live with Federal standards for their work.

Well, the two men—Illinois Central President Alan S. Boyd and Senior Vice President-Operations Otto H. Zimmerman—did indeed cut loose. But what they cut loose *with* was some of the most realistic and most pragmatic commentary yet made on the topic of standards.

The approach was positive—and not just a recognition that "what is, is." As Alan Boyd put it, "Insofar as track standards *do* codify a minimum structure beneath the wheels of our trains, I'm for them. I think every railroad officer should be." Zim was no less forthright: "Good, progressive track standards will help define the role of railroads in U.S. transportation. . .The Federal Railroad Administration has done our engineers, our operating officers and, I believe, our financial and executive people a favor—with track standards." And, IC's top operating man added, "I look forward to the time when workable and realistic track standards are coupled to workable, realistic equipment standards."

Heresy? Surrender to government control? Abrogation of managerial responsibility? Not at all. Call it instead a perception both of what the standards are *and of what they can do.*

Of course there will be problems—with M/W priorities, with work scheduling, with monitoring of compliance, maybe even with government officials who would like to go beyond the legitimate area of safety. But, there can be compensations, and Otto Zimmerman called attention to a few: For one thing, he said, if traffic cannot support a legally-defined quality of track, then this becomes another compelling factor for regulators to ponder in rate cases. On the other hand, if Federal inspectors downgrade a line and the carrier is unable or unwilling to bring it back up again, all parties with an interest will have an immediate and dramatic illustration of practical economics as they affect a piece of railroad.

For rail management, there can be an internal benefit. Now, there are well-defined limits beyond which a railroad cannot go in making trade-offs—the kind of trade-offs involving equipment and/or services which have sometimes resulted in a bad deal for the fixed plant.

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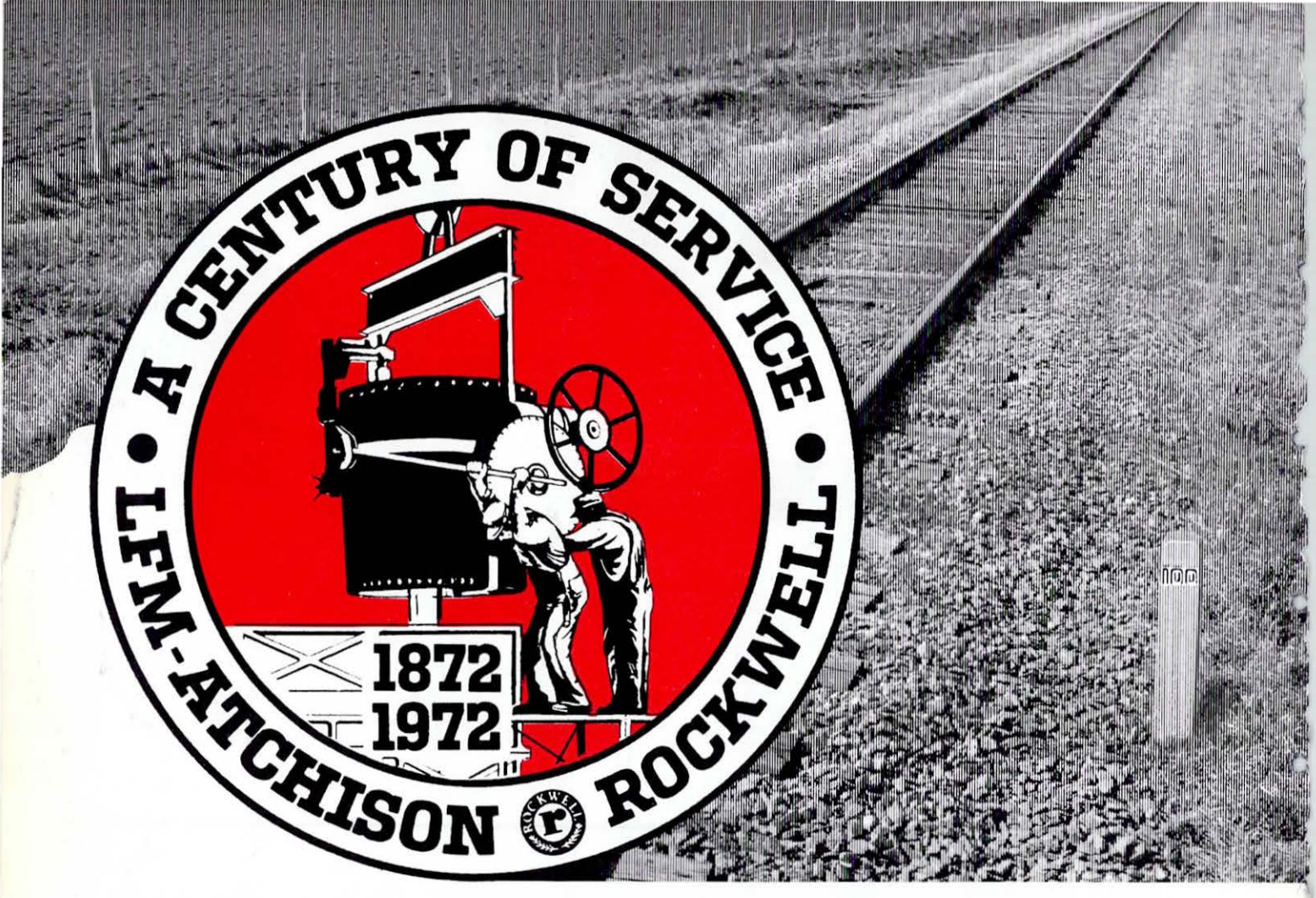

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